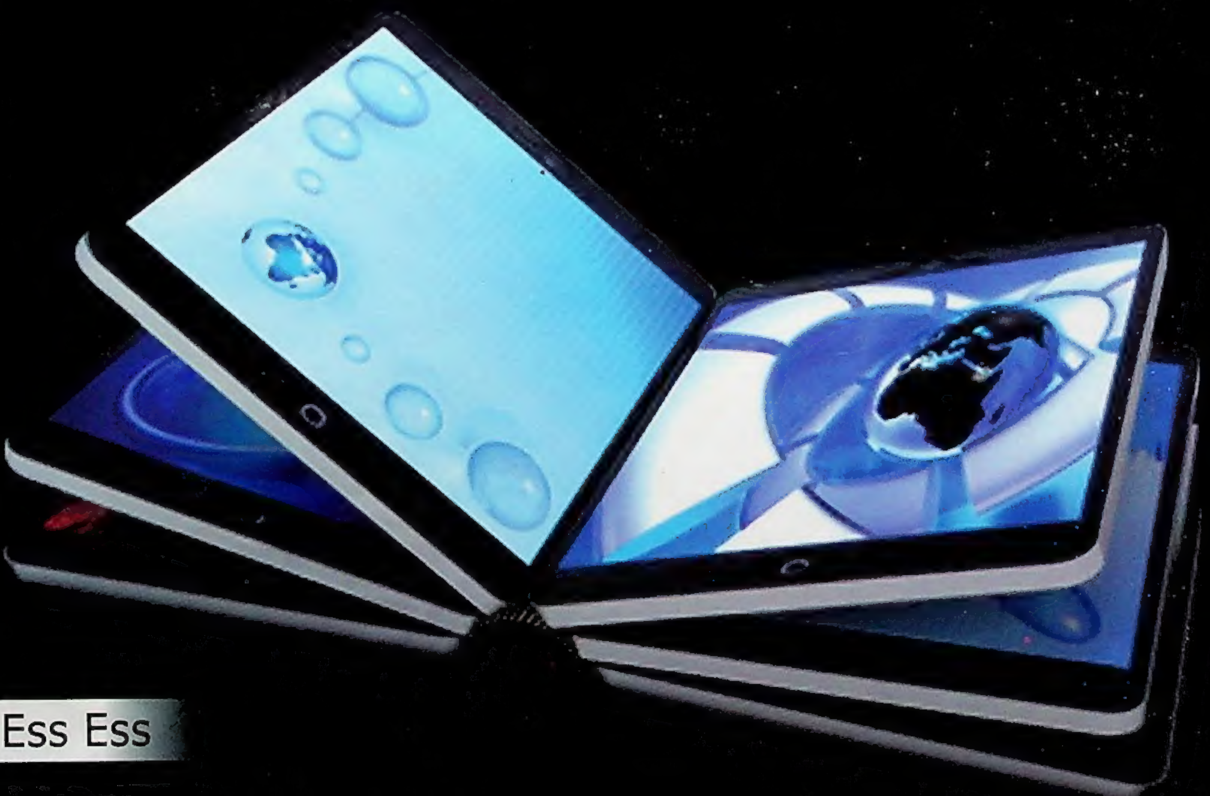
Manual of DIGITAL LIBRARIES



Ess Ess

Anil K. Dhiman
Yashoda Rani

Volume-II

ABOUT THE BOOK

Digital Libraries are getting much popularity among the library & information science fraternity. The present book on *Digital Libraries* is an attempt to describe various facets of digital library in the present scenario. The book is divided in to many chapters - Prologue, Concept of Digital Libraries, Digital Libraries - Components and Services, Documents in Digital Libraries, Internet and Internet Resources, Cataloguing of Digital Resources : Metadata and its Creation, Digital Preservation, Information Access in Digital Libraries, Copyrights and Intellectual Property Rights, Library Consortia, E-learning and Digital Libraries, Open Access and Institutional Repositories, Open Source Software and Epilogue, emphasizing on challenges of Digital Libraries and their future. Two appendices on Links and Resources; and Internet Companies, Library Automation Vendors and Information Organizations are also provided.

It is hoped this book will serve its purpose and will find its place among the teaching community, students of library & information science and the working community comprising of library and information scientists.

Dr. Anil Kumar Dhiman
129, Vidya Vihar Colony
Bhairon Mandir Road
KANKHAL-249 408 (Haridwar)
Uttarakhand

MANUAL OF DIGITAL LIBRARIES
(Vol. II)

MANUAL OF

DIGITAL LIBRARIES

(Volume II)

Dr. Anil Kumar Dhiman
and
Smt. Yashoda Rani

Ess Ess Publications
New Delhi

***Manual of Digital Libraries** (Set of Two Volumes)*

ISBN: 978-81-7000-656-5 (Set)
ISBN: 978-81-7000-654-1 (Volume-I)
ISBN: 978-81-7000-655-8 (Volume-II)

Rs.3950/- (Per Set)

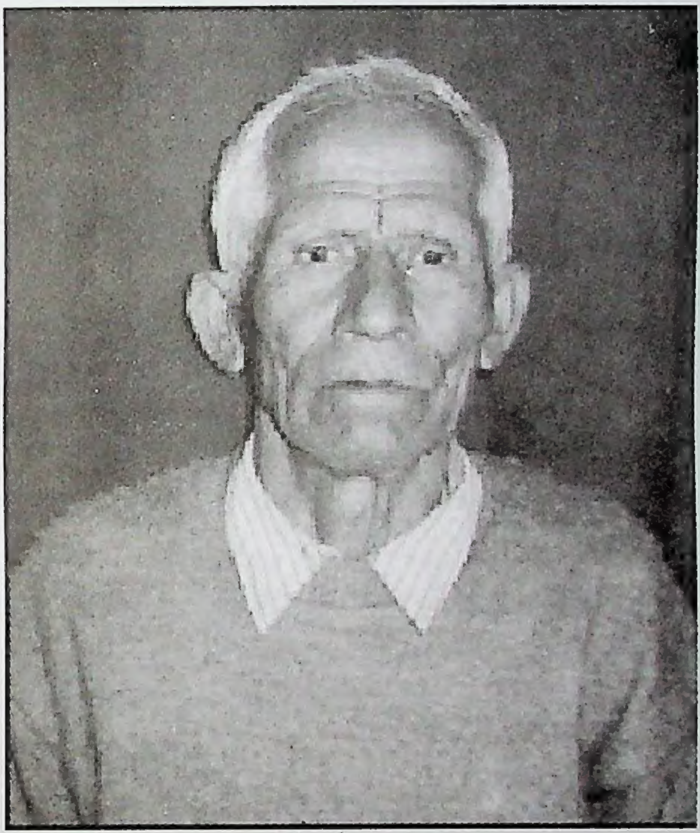
First Published 2012

Published by:
Ess Ess Publications
4837/24, Ansari Road,
Darya Ganj,
New Delhi-110 002.
INDIA
Phones: 23260807, 41563444
Fax: 41563334
E-mail: info@essessreference.com
www.essessreference.com

Cover Design by *Patch Creative Unit*

Printed and bound in India at Salasar Imaging Systems.

Dedicated to



Shri Ramlal Dhiman
(12.1.1935 – 01.1.2010)

Contents

VOL. I

Preface .... (*xv*)

1 Prologue 1

1.1. Electronic Libraries 3

1.2. Functions and Roles in the Electronic Library . 5

1.3. Virtual Libraries 8

1.4. Foundations and Evolution of Digital Library .. 11

1.5. Attempts in India for Digital Libraries 25

2 Digital Libraries - The Concept Elaborated 37

2.1. Definitions 41

2.2. Characteristics of Digital Libraries 51

2.3. Framework for Digital Library 55

2.4. Advantages and Disadvantages of Digital Libraries 94

2.5. Conventional Versus Digital Libraries 101

2.6. Digital Library Myths 125

3 Digital Library Components and Services 130

3.1. Components of Digital Library 131

3.2. Access Infrastructure 187

3.3. Computer and Network Infrastructure 191

3.4. Digital Resource Organization 200

3.5. Manpower Training 207

3.6. Steps Involved in Building Digital Library 208
3.8. Architectures and Interconnecting 221
3.9. HYBRID Library Services 228
4 Documents and Resources in Digital Libraries 242
4.1. Off-Line Publications 245
4.2. Online or Virtual Resources 308
4.3. Advantages of E-resources 345
4.4. Disadvantages of e-resources 345
4.5. E-resources: Issues 346
4.6. Archiving of e-resources 347
4.7. E-Resource archiving : Some Issues 348
4.8. Factors of Acquiring Electronic Resources . 349
4.9. Evaluation of Electronic Resources 355
4.10. Web site/Internet Resource Evaluation 357
4.11. Process of Evaluation 369
4.12. Online Searching 377
4.13. Some NeW Resources 385
5 Internet and Internet Resources 412
5.1. What Is Internet & How it has Evolved? 412
5.2. Getting Started with Internet 431
5.3. Facilities on Internet 434
5.4. Surfing the Internet 438
5.5. Internet in Libraries and Information Centres 448
5.9. Internet Resources 457
5.10. Intranets 587
6 Cataloguing Digital Resources : Metadata and Its Creation 591
6.1. Challenges to Traditional Cataloguing Practices 594
6.2. What Is Metadata? 599

6.3. Types of Metadata 601
6.4. What Does Metadata Do? 603
6.5. Metadata Standards 606
6.7. Metadata for Datasets 622
6.8. Extensions and Profiles 623
6.9. Frameworks for Interoperability and Exchange 624
6.10. Metadata Crosswalks 639
6.11. Metadata Registries 640
6.12. Metadata Creation 641
6.13. Methodology for Building Up Meta Resources 644
6.14. Organization of Meta Resources 646
6.15. Metadata and the Standards Process 651
6.16. Tools For Building Up A Meta Resource 654
6.17. Important Meta Resources 659
7 Digital Preservation 669
7.1. Preservation definitions in the digital world .. 671
7.2. Principles of Preservation 682
7.3. Thirteen ways for Digital Preservation 690
7.4. Approaches for Digital Preservation 712
7.5. Digitization Policy 716
7.8. Digitization - Points to be Considered 722
7.9. Data Models 730
7.10. Choosing Software and Hardware 737
7.11. Digitization Process 763
7.12. Digital archaeology 797

VOL. II

8 Open Access and Institutional Repositories 799
8.1. Open Access: The Concept and Definition .. 800
8.2. Open Archives Initiatives-the Mission 803
8.3. Significance of Open Access 809
8.4. OA Initiatives and E-prints 810
8.5. Open Access Journal - How It Works? 833
8.6. Some Open Access Journal Initiatives 834
8.7. Trends and Impact of Open Access 837
8.8. Implication of Open Access for Libraries 839
8.9. Open Access Archives or Open Access Repositories/Institutional Repositories 854
8.10. International Initiatives on Open Access Repositories 860
8.11. Open Access Initiatives In India 862
8.12. Open Access to Electronic Theses and Dissertations (ETD) 870
8.13. Self-Archiving 881
8.14. Problems and Solutions of OA repositories 889
8.15. Role of Library Professional 890
8.16. What Needs to be Done in India? 892
9 Information Access in Digital Libraries 897
9.1. Web Page 903
9.2. Static and Dynamic Page 904
9.3. Web In Various Platforms 904
9.4. Steps In Designing A Website 907
9.5. URL/Internet Address 936
9.6. Graphics Software 937
9.7. Web Authoring 938
9.8. Setting-up Free Website 938

9.10. Registering Your Domain Name 940
9.11. Hosting Website 940
9.12. Search Engines for Websites 941
9.13. Submission of Website 943
9.14. Technical Aspects to be Kept in Mind 944
9.15. Keeping statistics 947
9.16. Information Searching - Four-phase framework 948
9.17. Search Engines - Further Expanded 954
9.18. Resource Discovery Network (RDN) - The eLib Subject-based Information Gateways 962
9.19. Other Search Tools – For Specific Resources 966
9.20. Searching the Internet– Some Tips 970
9.21. OPACs and Web OPACs 972

10 Copyrights and Intellectual Property Rights 977
10.1. Copyright 981
10.2. Conflicts over Intellectual Property 996
10.3. Intellectual Property Rights (IPRs) 1006
10.4. Patent 1026
10.5. Trademarks 1026
10.6. Trade Secrets 1027
10.7. Open Access and IPRs 1028
10.8. Ethics of Encyption and Inscription 1034
10.9. Role of Libraries in Copyrights and IPRs 1037

11 Library Consortia 1041
11.1. Library Cooperation: International Scene 1042
11.2. Library Cooperation: Indian Scene 1043
11.3. Need for Library Cooperation 1044

11.4. Library Consortia 1045

11.5. Consortia Deals in India 1104

11.6. Role of National Library in Library Consortia 1189

12 E-Learning and Digital Libraries 1193

12.1. E-learning Terminology 1196

12.2. Types of E-Learning 1198

12.3. Common Benefits of E-learning 1206

12.4. Growth of E-learning and its Implications for Libraries 1211

12.5. Libraries and Shareable Online Resources 1214

12.6. E-Learning and libraries 1219

12.7. E-learning Technologies in Libraries 1222

12.8. Components of E-learning systems 1225

12.5. The Role of Digital Libraries in E-learning .. 1231

12.10. E-learners, Digital Libraries and Information Utilization 1233

12.11. Digital Libraries and E-learning Linkage; Institutional Concerns 1236

12.12. E-learners' Expectations From Librarians 1239

12.13. E-learners and Digital Library Resources 1241

12.14. Digital Library Reference Services 1243

12.15. Digital Library User Instruction 1245

12.16. Mobile - Learning 1247

12.17. Challenges and Opportunities 1252

12.18. E-learning in India 1258

13 Open Source Software for Creating Digital Library 1263

13.1. What is Open Source Software 1264

13.2. OSS and Libraries 1277

13.3. Digital Library Software 1279

14 Epilogue 1332

14.1. Digital Library Initiatives 1340

14.2. Barriers to Digital Library Initiatives 1344

14.3. Latest Development 1352

14.4. RSS Feeds 1362

14.5. Web 2.0 and Library 2.0 1366

14.6. Libraries as learning laboratories 1408

Appendices 1413

1. *Links and Resources* 1413

2 *Internet Companies, Library Automation Vendors and Information Organizations* 1421

Bibliography 1434

Index 1450

8

Open Access and Institutional Repositories

The access to information consequent to the Information Technology revolution was a major landmark of the last Century. In spite of the remarkable achievements in making Information accessible, the fact that a major share of vital research data is still behind access barriers may seem a bit paradoxical. Scholars from around the world and particularly from the developing world have been categorically denied access to vital research that could make a big difference. This obviously makes the current publishing crisis, which Prof. Peter Suber identifies as the 'serials crisis' or rather 'serials pricing and access crisis' as the epicenter of discussions worldwide. The crisis is characterized by vicious cycle of an exponential increase in the prices of journals and a decreasing funding allocation to maintain the collections. Even well off institutes in affluent societies have been badly affected, not to mention the institutions in developing countries.

Many factors have directly or indirectly contributed, including the rising costs of publishing, ever increasing profit motives, mergers and acquisitions- just to name a few. Profit motive is one major factor that has contributed significantly

to the crisis. The recent mergers and acquisitions in the publishing industry has left behind just a handful of monopolies which have almost no competition given the unique characteristics of scholarly publication. The end of competition has obviously endowed these publishers enough freedom to hike the prices as they wish.

Internet emerged in the 1990's as a kind of miracle against this background. For the first time, it became physically and economically possible to connect authors, who want to give away their work, with readers who want to read and build on it. This new form of distribution -online, free of charge, and free of needless licensing restrictions- is now called Open Access.

There are three obvious reasons why the Open Access/ Archive initiative is necessary. First, colleges and universities need to cut costs. One way of doing that is to find some way to counter the rising prices of international scientific literature. The second reason for this initiative is that universities and colleges are under increasing pressure to legitimize their activities, both to the general public and to the authorities that provide their funding unlikely to be sufficient on its own as a legitimization and public relation tool. The third reason is that institutions of higher education need to develop and to make available electronic teaching and learning materials.

8.1. OPEN ACCESS: THE CONCEPT AND DEFINITION

What is the point in doing science if it were not to be accessible?' This single question has now become the epicenter of thought world wide. To make a difference, research need to be freely accessible to scholars and policy makers. A major share of the research is funded from public money. This obviously necessitates the free access to this vital information. In the domain of scholarly communication, access to up-to-date research data is so vital that it may even

make a difference in the research and development of a nation.

Open Access by definition means "immediate, permanent, toll-free, non-gerrymandered, online access to full-text". Here, in this definition from the BOAI (Budapest Open Access Initiative) 'open access' means free availability of information on the public domains of Internet permitting any users to read, download, copy, distribute, print, search, or link to the full-texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.

According to the Budapest Open Access Initiative, Open Access contributions must satisfy two conditions:

(i) The author(s) and right holder(s) of such contributions grant(s) to all users a free, irrevocable, world wide, right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship.

(ii) A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in an appropriate standard electronic format is deposited (and thus published) in at least one online repository using suitable technical standards (such as the Open Archive definitions) that is supported and maintained by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access,

unrestricted distribution, inter operability, and long-term archiving.

Further, BOAI provided the Open Access as free availability of information on Internet, permitting the scholars to access the information through World Wide Web which permitted a seamless access of information to the researchers regardless of the place in the global sphere. This very much applies to journal articles in electronic form despite the consequences of whether or not the library has got a subscription to the relevant journal in which the articles were published. This also includes the e-conference proceedings, e-dissertations, e-theses, e-reports, e-contents etc.

BOAI only seeks open access for the scientific and scholarly research texts that authors give to publishers and readers without asking for any kind of royalty or payment. As the BOAI public statement puts it, "primarily, this category encompasses...peer-reviewed journal articles, but it also includes any unreviewed preprints that [scholars] might wish to put online for comment or to alert colleagues to important research findings." It does not include books from which their authors would prefer to generate revenue. It does not include any non-scholarly writings, such as novels or news. "While the BOAI does not specifically cover donated scholarship other than peer- reviewed journal articles and preprints, it could be extended quite naturally to all the writings for which authors do not expect payment. These include scholarly monographs on specialized topics, conference proceedings, theses and dissertations, government reports, and statutes and judicial opinions."

Wikipedia defines Open Access movement – also known as open-access publishing and free online scholarship, as "an effort to grant access to a large variety of up to date information sources for free." The American Research Libraries Association (ARLA) Task Force defines "Open

access as a cost effective way to disseminate and use information. It is an alternative to the traditional subscription-based publishing modal possible by new digital technologies and networked communication." Archive definitions that is supported and maintained by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access are *unrestricted distribution, interoperability, and long- term archiving.*

Though there are many definitions that exist for Open Access, Open Access basically means free access to scholarly publications available online to libraries and end users and which can be reproduced and distributed freely.

"We define open access as a comprehensive source of human knowledge and cultural heritage that has been approved by the scientific community." Establishing open access as a worthwhile procedure ideally requires the active commitment of each and every individual producer of scientific knowledge and holder of cultural heritage. Open access contributions include original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials and scholarly multimedia material.

8.2. OPEN ARCHIVES INITIATIVES-THE MISSION

The principal missions attached to Open Archives Initiatives (OAI) can be described as follows:

- To develop and promote interoperability standard for facilitating dissemination of contents electronically for greater academic achievements;
- To enhance access of e-prints archives as an indispensable means of increasing scholarly communications;

- Relevance in opening up new avenues for accessing to a wide spectrum of digital materials on web;
- Exploring and enabling broader scope of knowledge for its application;
- Accelerating the information access on web to add substantial value to the research output;
- The free availability of information on Internet which is permissible for use by any reader to read, download, copy, distribute, print, search or link to the full texts of the articles, crawl them for indexing, pass them ,as data to software, or use them for any other lawful purpose without any financial, legal or technical barriers other than those inseparable from gaining access to the Internet itself.

The mission of OAI principally focuses on e-prints solutions and interoperability as a means of achieving their global acceptance. A number of aspects of the technical specifications were cardinal to the original e-print focused assignment which require global acceptance for use of the large communities.

For accomplishing Open Access or OA mission, OA is based on three pilolars. These are – Open Access Publishing, Open Access Support and Open Access Archving.

8.2.1. Open Access: the Three Pillars

Open Access may be considered as borne on three pillars- Open Access Publishing, Open Access Archiving and Open Access Support/Advocacy. These three pillars are integral in creating sustainable Open Access to scholarly communication.

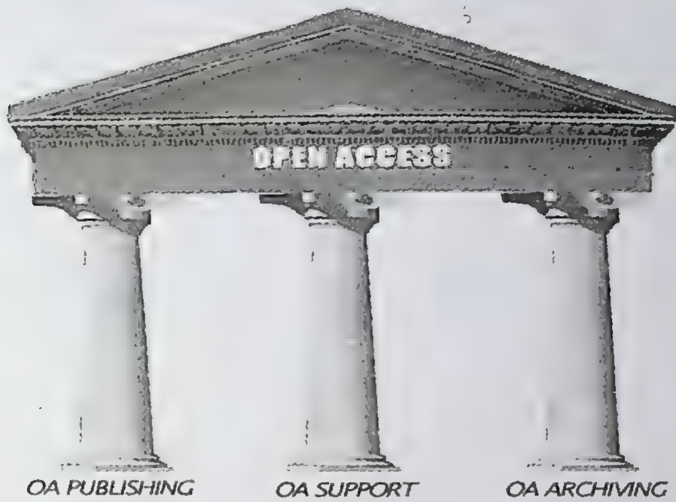


Fig. 8.1. Pillars of Open Access

Open Access Publishing : Journals are increasingly finding it a viable option to go Open Access given the fact that many Open Access Journals have rapidly built upon readership base, visibility and impact. For example, Calicut Medical Journal (http://www.calicutmedical journal.org/), a new Open Access Journal crossed one million hits within just six months with all articles ranked highly on all major search engines. Similar visibility and an increase in International submissions was noticed for other Open Access Journals like Journal of Postgraduate Medicine (http:// www.jpgmonline.com/) and Online Journal of Health and Allied Sciences (http:// www.ojhas.org/), all of which are published from India.

Open Access Support : This open access support model does not infringe the publishers' right to profit. BOAI clarifies this by stating, "there are many alternative sources of funds for this purpose, including the foundations and governments that fund research, the universities and laboratories that employ researcher endowments set up by discipline or institution, friends of the cause of open access,

profits from the sale of add-ons to the basic texts, funds freed up by the demise or cancellation of journals charging traditional subscription or access fees, or even contribution from researchers themselves. There is no need to favour one of these solutions over the others for all disciplines or nations, and no need to stop looking for other, creative alternatives".

Open Access Archiving : Open Access archiving offers immediate solution to the need to free scholarly communication from the shackles of access barriers. Since 1991, high-energy physics researchers from around the world were networked through an eprint archive maintained by Paul Gispang of Los Alamos National Library (http://lanl.gov/) which later moved to Cornell University that currently hosts the archive. This archive- 'arxiv' (http://arxive.org/) receives two-third of its total hits from institutions outside the United States, including many research facilities in developing regions. The archive has become indispensable to researchers in research institutions that would otherwise be excluded from the frontline of science for economic and other reasons.

8.2.2. Beneficiaries of OA Initatives

OA serves the interests of cross sections of the knowledge society. The following interest groups are benefited by open access:

Authors: OA enlarges their audience and increases the visibility and impact of their work.

Readers: OA gives them barrier-free access to the literature they need for their research.

Teachers and Students: OA puts rich and poor on an equal footing for these key resources and eliminates the need for permissions to reproduce and distribute content.

Libraries: OA solves the pricing crisis for scholarly

journals. It also solves what is called the permission crisis.

Universities: OA increases the visibility of their faculty and institution, reduces their expenses for journals, and advances their mission to share knowledge.

Journals and Publishers: OA makes their articles more visible, discoverable, retrievable, and useful. If a journal is OA, then it can use its increased visibility to attract submissions, advertising and subscriptions.

Funding Agencies: OA increases the return on their investment in research, making the results of the funded research more widely available, more discoverable, more retrievable and more useful, OA serves public funding agencies in a second way as well, by providing public access to the results of publicly funded research.

Governments: As funders of research, governments benefit from OA in all the ways that funding agencies do. OA also promotes democracy by sharing government information as rapidly and widely as possible.

Citizens: OA gives them access to peer-reviewed research (most of which is unavailable in public libraries) and gives them access to the research for which they have already paid through their taxes. It also helps them indirectly by helping the researchers, physicians, manufacturers, technologists, and others who make use of cutting-edge research for their benefit.

8.2.3. Barriers of OA Initiatives

Open access is not synonymous with universal access. Even after OA has been achieved, at least four kinds of access barrier might remain in place:

(i) Filtering and Censorship Barriers : Many schools, employers, and governments want to limit what people can see.

(ii) Language Barriers : Most online literature is in English, or just one language, and machine translation is very weak.

(iii) Handicap Access Barriers : Most web sites are not yet as accessible to handicapped users as they should be.

(iv) Connectivity Barriers : The digital divide keeps billions of people, including millions of serious scholars, offline.

Even if we want to remove these four barriers, there is no reason to hold off using the term "open access" until we have succeeded. Removing price and permission barriers is a significant plateau worth recognizing with a special name.

8.2.4. Issues Relating to Open Access

Peter Suber in his article Open Access to Science and Scholarship, discussed the following major issues relating to OA initiatives.

Open Access is Compatible with Copyright : Authors are copyright holders until and unless they transfer copyright to a publisher. If authors consent to open access while they still hold copyright, then open access is authorized and lawful. The fact that most musicians, film-makers, and software programmers do not consent to open access should not make us pessimistic about open access to science. Most musicians and other creators hope to generate revenue from their work. Again, scientists and scholars are in the nearly unique position of being able to consent to open access without losing revenue. They have everything to gain and nothing to lose by doing so.

Open Access is Compatible with Print : Users who prefer to read printed text can print any-online file that they like or at least any open-access file. Libraries and publishers that want to use print for long-term preservation can do the same. Journals that want to sell a print edition to users who

prefer it, may do so at cost, or even for a profit.

Open Access is Compatible with Peer Review : In fact, all the major open-access projects and campaigns, such as, the Public Library of Science, the Budapest Open Access Initiative, BioMed Central, SPARC, the Bethesda group insist on the importance of peer review. Open access to science and scholarship is not about putting papers on personal web sites and bypassing peer review. Open access removes the barrier of price, not the filter of quality control.

Open Access is within the Reach of Scientists and Scholars : The scientists and scholars can launch an open-access archive whenever they like, at essentially no cost, and more and more universities and disciplines are doing so. With a bit more planning and investment, scholars can launch an open-access journal. For the first time since the rise of the commercial publishing of scientific journals, scientific communication can be in the hands of scientists, who answer to one another, rather than corporations, who answer to shareholders. The only question is whether scientists are ready to seize this beautiful opportunity.

8.3. SIGNIFICANCE OF OPEN ACCESS

The significance of Open Access has a wide application value. Among these, the principal values embodied therein can be summarized as below.

- The literature contained in Open Access are digital by nature and can be reachable free of cost with certain copyright and licensing conditions;
- Open Access is entirely compatible with peer-reviewed literature available on web;
- Imposition of restrictions is maintained regarding the propagation through production of literature on Open Access even if, it is less expensive and more convenient

than the production of conventional literature.

Digital Library Federation and Coalition of Networked Information affirmed their organizational support and resources for OAI in 2000. Open Access eliminates two kinds of admittance barriers:

– Value barriers, and
– Authorization barriers allied with restrictive use of copyright, licensing terms, or Digital Rights Management.

But the authors using the information must rightly acknowledge the source of the Open Access while reproducing, citing and distributing of information. A recent study of the Institute for Scientific Information (ISI) has reported that traditional (Non-OA) journals and Open Access (OA) journals have similar citation impact factors. The ISI's press release announced (<http://www.isinet.com/oaj>)

"Of the 8,700 selected journals currently covered in Web of Science, 191 are OA journals... [A study on] whether OA journals perform differently from other journals in their respective fields [found] no discernible difference in terms of citation impact or frequency with which the journal is cited".

It is certainly welcome news that there are no impact differences between the 191 OA journals and the 8509 non-OA journals indexed by ISI, equating for comparable journals as closely as possible. This proves that the skeptics who thought OA journals would be of lower quality or impact and would not be indexed by ISI were wrong – at least for those 191 OA journals. OA journals are indexed by ISI, and they do have comparable citation impacts.

8.4. OA Initiatives AND E-PRINTS

The constant increasing inter-disciplinary research, multi dimensional and relevant information of the scholars in

alternation to the traditional publishing propagated for precipitation to the Open Archives Initiatives. The velocity of change demands mechanisms for reporting results with lower latency times than the ones experienced in the established journal system. The ubiquity of high speed networks and personal computing has created further consumer demands for use of the Web for delivery of research results. The e-prints available on Web are of multiform which encompasses e-journals, e-reports, e-proceedings , e-books etc. and the Web has been proved to a viable platform for dissemination and access of information by the scholar. The Web further is a befitting dais for e-print repositories. To mention, the e-print providers adopted interoperability solution known as 'Metadata Harvesting' which allows the e-print providers to explore their metadata through an open interface with the intention of using the metadata as a basis of value added service. The e-print which includes e-journals, e-reports, e-proceedings, e-books etc, as stated earlier, the e-journals have been proved at the forefront of preservation discussions because of their significant role in providing the authentic scientific communication and the commercial interests involved and more particularly, acclimatizing the scholars research. The practices for preserving electronic journals show an increased maturity as evidenced by more formalized procedures such as a DTD for journals.

For promoting research articles for the research communities through Open Access, two imperative segments can be employed for accelerating the scientific communication to the scholars such as, (a) Open Access Journals and (b) Open Access Archives or Open Access Repositories.

8.4.1. Open Access Journals

Open Access journals (OAJ) are the peer reviewed journals with their contents duly approved which are made available freely on the web to the user communities without

any geographical limitations. Their operating expenses consist of peer review, manuscript preparation, and server space and OAJ disburse the payment like that of the broadcasting stations such as, television and radio perform with an intention to disseminate the information so as to comfortable access by the scholars free of charge and also for one and all provided they are accessing with the befitting equipments and compatible hardware and software. Sometimes this puts an impact that journals have a subsidy from the hosting university or professional society and sometimes journals charge towards the processing fee on accepted articles which is to be paid by the author or sponsorer of the author such as, employer, or funding agency. Open Access journals, however, that charges processing fees typically relinquish them in cases of financial constraints. Open Access journals with institutional subsidies tend to charge no processing fees. Open Access journals can be obtained on lower subsidies or fees if they have income from other publications, advertising, priced add-ons, or auxiliary services. Some Open Access publishers waive the fee for all researchers affiliated with institutions that have purchased an annual membership. There are a lot of areas for creativity in finding ways to pay the costs of peer-reviewed Open Archive Journals.

Directory of Open Access Journals (DOAJ) which provide free, full text, quality controlled, evaluated, filtered scientific and scholarly communications through e-journals covers more than 2250 journals in electronic form almost in all subjects and languages and 641 electronic journals are searchable at article level. Further, around 98195 articles are included in the DOAJ. The world wide journals available in electronic form include various subjects such as, Agriculture and Food Sciences, Arts and Architecture, Biology and Life Sciences, Business and Economics, Chemistry, Earth and Environmental Sciences, General Works, Health Sciences,

History and Archaeology, Languages and Literatures, Law and Political Science, Mathematics and Statistics, Philosophy and Religion, Physics and Astronomy, Science General, Social Sciences and Technology and Engineering. The journals are hyperlinked for easy assess to their contents.

Further, it may be mentioned that, the infolibrarian.com, one of the foremost websites in the field of Library and Information Science covers a wide spectrum of e-journals, e-articles, e-books, e-databases, e-proceeding, apart from other broad segments such as, Catalogues, Digital Libraries, Education and Jobs, Internet Resources, Technology etc. and all are available in electronic form which facilitate scholarly communications for proliferation of research and information and it also serves as a provider of latest information about various international and national conferences including other areas of study. This adds a potential value for research and current information. The *infolibrarian.com* embodies many articles arranged over 18 extensive aspects in Library and Information Science such as, Collection Development, Digital/ Electronic Library, E-books/Journals, Information Resources, Knowledge Management, Library Development, Marketing of Library and Information Science, Open Access/ Initiatives, Open Source for Libraries, Scientometrics/ Cybermetrics, Technical Processing, Web Technology etc., which are accessible by the scholars, users in electronic form on free access over web. The scholars, users can make the best use of the electronic literature for consultation, download, and copy for greater academic achievements. The articles are reachable either through HTML or PDF and hence, it becomes essential that the scholars should have the compatible software to open or down load the same.

Mention may be made that, the leading publishers of the globe have started providing wide range of free on line access to the journals in PDF published by them against free subscriptions of the Library which can retrieved on the basis

of Internet Protocol address of the Library/ Institute subject to the log in with user name and password. The publishers also provide online access either directly from their home page or through aggregators. The total coverage of e-journals in various subjects in *infolibrarian.com* broadly includes Archives, Indian e-journals, International and Publishers and all these are hyperlinked. Moreover, the *FreeFullText.com* disseminates links to the full-text content of over 7000 scholarly periodicals arranged alphabetically and can be searchable in easy way and the journals along with the most of the articles may be assessed online free of cost (www.freefulltext.com). In addition to these, the *ArticleCube.com* is another exponent of the airing free articles on web where, 10354 Excellent Articles in the Article Directory from 2244 Authors are available.

Table 8.1 gives a list of open journals in medical sciences available freely on Internet.

Table 8.1. Indian Medical Journals Hosted Open Access

Sr. No.	Journal Name	URL
1	Annals of Cardiac Anesthesia	http://medind.nic.in/
2	Annals of Indian Academy of Neurology	http://www.anna/sofian.org
3	Annals of Thoracic Medicine	http://www.thoracicmedicine.org
4	Endodontology	http://medind.nic.in/
5	Health Administrator	http://medind.nic.in/
6	Indian Journal of Aerospace Medicine	http://medind.nic.in/
7	Indian Journal of Allergy Asthma and Immunology	http://medind.nic.in/
8	Indian Journal of Anesthesia	http://medind.nic.in/
9	Indian Journal of Cancer	http://www.bioline.org.br/cn

10	Indian Journal of Chest Diseases and Allied Sciences	http://medind.nic.in/
11	Indian Journal of Clinical Biochemistry	http://medind.nic.in/
12	Indian Journal of Community Medicine	http://medind.nic.in/
13	Indian Journal of Critical Care Medicine	http://www.ijccm.org
14	Indian Journal of Dermatology	http://www.e-ijd.org
15	Indian Journal of Dermatology, Venereology and Leprology	http://www.ijdvl.com
16	Indian Journal of Gastroenterology	http://medind.nic.in/
17	Indian Journal of Human Genetics	http://www.ijhg.com
18	Indian Journal of Medical and Pediatric Oncology	http://medind.nic.in/
19	Indian Journal of Medical Microbiology	http://www.ijmm.org http://medind.nic.in/
20	Indian Journal of Medical Research	http://medind.nic.in/
21	Indian Journal of Medical Sciences	http://www.indianjmedsci.org
22	Indian Journal of Medical Informatics	http://www.indmed.nic.in/imcwebij.html
23	Indian Journal of Nephrology	http://medind.nic.in/
24	Indian Journal of Nuclear Medicine	http://medind.nic.in/
25	Indian Journal of Occupational and Environmental Medicine	http://medind.nic.in/ http://www.ijoem.com
26	Indian Journal of Occupational Therapy	http://medind.nic.in/
27	Indian Journal Ophthalmology	http://www.ijo.in
28	Indian Journal of Otolaryngology	http://www.ijohns.com

	and Head and Neck Surgery	
29	Indian. Journal of Palliative Care	http://www.jpalliativecare.com
30	Indian Journal of Pediatrics	http://medind.nic.in/
31	Indian Journal of Pharmacology	http://www.ijp-online.com
32	Indian Journal of Plastic Surgery	http://www.ijps.org
33	Indian Journal for the Practising Doctor	http://www.indmedica.com/journals.php? journalid=3
34	Indian Journal of Preventive and Social Medicine	http://medind.nic.in/
35	Indian Journal of Radiology and Imaging	http://medind.nic.in/
36	Indian Journal of Sexually Transmitted Diseases	http://medind.nic.in/
37	Indian Journal of Surgery	http://www./nd/anjsurg.com
38	Indian Journal of Thoracic and Cardiovascular Surgery	http://medind.nic.in/
39	Indian Journal of Tuberculosis	http://medind.nic.in/
40	Indian Journal of Urology	http://www.indianjurol.com
41	Indian Pediatrics	http://medind.nic.in/
42	International Journal of Diabetes in Developing Countries	http://www.ijddc.com
43	International Journal of Human Genetics	http://www.krepublishers.com/KRE-New-J/
44	J. K. Practitioner	http://medind.nic.in/
45	Journal of Biosciences	http://www.ias.ac.in/jbiosci
46	Journal of Cancer research and Therapeutics	http://www.cancerjournal.net
47	Journal of Family Welfare	http://medind.nic.in/
48	Journal of Genetics	http://www.ias.ac.in/jgenet
49	Journal of Indian Academy of Forensic Medicine	http://medind.nic.in/

50	Journal of Indian Association of Pediatric Surgeons	http://www.jiaps.com http://medind.nic.in/
51	Journal of Indian Rheumatology Association	http://medind.mc./n/
52	Journal of Indian Society of Pedodontics and Preventive Dentistry	http://wwwjisppd.com http://medind.nic.in/
53	Journal of Medical Physics	http://wwwjmp.org.in
54	Journal of Minimal Access Surgery	http://www.journalofmas.com
55	Journal of Obstetrics and Gynecology of India	http://medind.nic.in/
56	Journal of Pediatric Neurosciences	http://www.pedlatncneuros clences.com
57	Journal of Postgraduate Medicine	http://www.jpgmonline.com
58	Journal of The Anatomical Society of India	http://medind.nic.in/
59	Journal of the Indian Medical Association	http://www.library.umassmed. edu/ejoumalsFaction.cfm
60	Journal, Indian Academy of Clinical Medicine	http://medind.nic.in/
61	Medical Journal Armed Forces India	http://medind.nic.in/
62	Neurology India	http://www.neurologyindia.com
63	NTI Bulletin	http://medind.nic.in/
64	Online Journal of Anaesthesiology	http://www.theiaforum.org/
65	Proceeding of INSA-B (Biological Sciences)	http://insa.ac.in
66	The Journal of Indian Prosthodontlc Society	http://wwwjprosthodont.com
67	Trends in Biomaterials and Artificial Organs	http://medind.nic.in/

Some more significant web addresses relating to free journals are placed below :

1. D-Lib Magazine : http://www.dlib.org/
2. Library Journal Online : http://www.libraryjournal.com/
3. Ariadne: http://www.ariadne.ac.uk/
4. Journal of Electronic Publishing: http://www.press.umich.edu/jep/press.umich
5. Freely accessible electronic journals in Library Science: http://www.lib.usf.edu/ ~ifrank/libjournals.html
6. Serials in Cyberspace e-journals list: http://www.uvm.edu/~bmaclenn/#ejour
7. Internet Library for Librarians: http://www.itcompany.com/inforetriever/
8. Online Dictionary of Library and Information Science: http://www.wcsu.edu/ library/odlis.html
9. Librarians' Resource Centre: http://www. sla.org/chapter/ctor/toolbox/resource/page3. htm
10. ACRL Standards and Guidelines: http:// www.ala.org/acrl/guides/index.html
11. Library-Oriented Lists and Electronic Serials: http://www.wrlc.org/liblists//liblists. htm
12. Current Cites: An Annotated Bibliography of Selected Articles, Books, and Digital Documents on Information Technology: http://sunsite.berkeley.edu/CurrentCites/
13. IFLA electronic collections: http://www.ifla. org/II/index.htm
14. Acq. Web references in collection develop ment: http://acqweb.library.vanderbilt.edu

8.4.2. Role and Relevance of Publishers

BOAI confirms that open access is economically feasible, gives readers extraordinary power to find and make

use of relevant literature, and gives authors and their works vast and measurable new visibility, readership and impact and suggests self-archiving and publishing in OA journals as two modes to achieve open access to scholarly literature.

Wellcome Trust Report made the following observations regarding the dominance of commercial publishers.

- The current market structure does not operate in the long-term interests of the research community.
- Commercial publishers are dominant though many top journals are published by not-for-profit organizations.
- The 'public good' element of scientific work means market solutions are inefficient.
- Electronic publishing is not currently challenging the dominance of commercial publishers.
- Demand is price-inelastic because price is unimportant at point of use for the research community and journals are not easily substitutable for each other.
- Authors face a limited number of journals and their primary concerns are the reputation and reach of the journal. In general, authors are not concerned with price and cost characteristics. There is also a limited amount of substitutability between journals for authors when offering their work for publication.

Suber in the articles published in *DJLT* in 2008 mentions pricing crisis (libraries must pay intolerable prices for journals) and permission crisis (libraries are hamstrung by licensing terms and software locks that prevent them from using electronic journals in the same full and free way that they may now use print journals) severely impeding research and making libraries paying much more in order to get much less. But the fact is that nobody writes for just keeping their papers in an OA repository, they should also aim for getting peer

recognition by publishing in a high impact journal. The author may also try to get his/her paper archived in an OA repository or website along with or after publication in a formal printed journal. The rights and permissions granted by few major publishers are examined by *Jeevan* in his study that is published in IASLIC XXII seminar proceedings in 2006 to find out how supportive they are in disseminating research information in a democratic fashion to counter access divide among countries and communities.

He has explored the following publishers to find out their tolerance towards alternative open access publishing :

Table 8.2. Publishers, Publications and Subject Areas

Sl No.	Publisher	No. of Journals	Subject Areas
1	Association for Computing Machinery (ACM)	45	Computer Science, Information Technology
2	American Chemical Society (ACS)	36	Chemistry, Chemical Engineering, Chemical Sciences
3	American Physical Society (APS)	10	Physics, Physical Sciences
4	Blackwell	805	Physical Sciences, Life Sciences, Medicine, Social Sciences and Humanities
5	Elsevier Science	1800	Health Science, Physical Science, Life Science and Social Sciences
6	Institution of Engineering and Technology (erstwhile Institution of Electrical Engineers or IEE)	25	Electrical, Electronics, Computers etc.
7	Institute of Electrical and Electronics Engineers (IEEE)	128	Electrical, Electronics, Computers etc.

8	Institute of Physics Publishing (IOP)	58	Physics, Physical Sciences
9	Nature Publishing Group (NPG)	63	Science, Medicine
10	Oxford University Press (OUP)	180	Humanities, Law, Life Sciences, Mathematics & Physical Sciences, Medicine and, Social Sciences
11	Palgrave Macmillan	84	Business, Information Technology, Urban Design, Statistics, Political Science
12	The Public Library of Science (PLoS)	7	Science, Medicine
13	Royal Society of Chemistry (RSC)	20	Chemistry, Chemical Engineering, Chemical Sciences
14	Science	1	Science
15	Springer	800	Science, Social Science, Medicine, Engineering
16	Taylor & Francis	1000	Arts & humanities, Science, Social Science, Engineering
17	Wiley	2500	Science, Social Science, Medicine, Engineering, Law

A preprint is defined as un-refereed author version of the article and a postprint is defined as being the final draft author manuscript as accepted for publication, following peer review, without the publisher's copy editing and proof correction process. The responses of the individual publishers towards OA are highlighted in Table 8.3.

Table 8.3. Publishers and Open Access

Sl.No.	Publisher	Response to Open Access
1	Association for Computing Machinery (ACM)	Grants right to post author-prepared versions of the work covered by ACM copyright in a personal collection on the Author's Home Page and on a publicly accessible server of their employer. Such posting is limited to noncommercial access and personal use by others, and must include the following notice both embedded within the full text file and in the accompanying citation: "© ACM, YYYY. This is the author's version of the work. It is posted here by permission of ACM for your personal use. Not for redistribution. The definitive version was published in PUBLICATION, {VOL#, ISS#,(DATE)}
2	American Chemical Society (ACS)	ACS does not permit published or unpublished papers to be posted on Web sites other than ACS's Web sites. On the Copyright Status Form, authors and their employers are informed that they may post on the Web, the title of the paper, abstract (no other text), tables, and figures of their own papers on their own Web sites. In addition, authors may transmit to up to 50 colleagues their own paper, with a notice of copyright and that they alert their colleagues that they may not further disseminate/publish the paper. In addition, authors of new papers are given instructions on how to link to ACS's Web site and the first 50 people who access the article may do so without charge. Students and guides should be aware that posting of theses and dissertations material on the Web prior to submission of material from that thesis/dissertation to

		an ACS journal may affect publication in that journal. Whether Web posting is considered prior publication may be evaluated on a case-by-case basis by the journal's editor. If an ACS journal editor considers Web posting to be "prior publication", the paper will not be accepted for publication.
3	American Physical Society (APS)	The author or the author's employer can use all or part of the APS published article, including the APS-prepared version (e.g., the PDF from the online journal) without revision or modification, on the author's or employer's website as long as a fee is not charged. If a fee is charged, then APS permission must be sought. In all cases, the appropriate bibliographic citation and notice of the APS copyright must be included. When a fee is imposed on free access e-print server, the author must either obtain permission from APS or withdraw the article from the e-print server or Institutional Repository. The author has the right to post and update the article on a free-access e-print server using files prepared and formatted by the author. Any such posting made or updated after acceptance of the article for publication by APS shall include a link to the online abstract in the APS journal or to the entry page of the journal. In all cases, the appropriate bibliographic citation and notice of the APS copyright must be included. If the author wishes to use the APS-prepared version (e.g., the PDF from the online journal) on an e-print server other than authors' or employer's website, then APS permission must be sought. The author is permitted to provide, for

		research purposes as long as a fee is not charged, a PDF copy of his/her article using either the APS-prepared version or the author repared version.
4	Blackwell	Author retains the following rights to re-use the Article, as long as no commercial purposes are involved. Prior to acceptance: We ask that as part of the publishing process author acknowledges that the Article has been submitted to the Journal. author can share print or electronic copies of the Article with colleagues; Author may post an electronic version of the Article on personal website, on employer's website/repository and on free public servers in his/her subject area. After acceptance: With appropriate acknowledgement to the journal, the author can share print or electronic copies of the Articles with colleagues, author may post an electronic version of the Article on personal website, on employer's website/repository and on free public servers in the subject area. For most journals there is a requirement that posting of the Article online does not take place until a specified minimum period has elapsed. Electronic versions of the accepted article must include the following statement, adapted as necessary for your Article: Author Posting. © (Insert name of copyright holder as shown on the published article) (insert year of publication). This is the author's version of the work. It is posted here by permission of (insert name of copyright holder) for personal use, not for redistribution. The definitive version was published in (insert journal name), (insert volume, issue number and pages) http://dx.doi.org/ (insert doi number).

		Authors are not permitted to post the Blackwell Publishing PDF version of the Article online. Open Access publication option, OnlineOpen enables authors who wish to publish their research in a journal published by Blackwell the opportunity to ensure that their Article is immediately made freely available for all to access online. Here also acknowledgement to the journal source is required and the distribution only for non-commercial purposes. This new pay-to-publish option is an important part of Blackwell's response to the calls for open access and our commitment to viable high quality publishing on behalf of societies. They will be charged the fee when their Article is accepted and the author retains copyright in the Article.
5	Elsevier Science	Author has the right his/her version of the article on personal web page or the web site of the institution, provided a link to the journal's home page or the article's DOI is included along with a complete citation for the article. The author can update pre-print version (e.g. the Word or Tex form) to reflect changes made during the peer review and editing process.
6	Institution of Engineering and Technology (erstwhile Institution of Electrical Engineers or IER)	The author(s) and/or the organizations for whom the work was performed shall be entitled to post preprints of their work (but not the published PDF) on repositories, server and websites of any sort, provided that these servers are operated by the author's institution or the funding body contributing to the research. Authors may not deposit their article in a third-party repository. Access to such servers is not for commercial use and does not depend on payment of access, subscription, or membership fees.

		The following wording clearly appears on the front page of the preprint: "This paper is a preprint of a paper submitted to Journal and is subject to Institution of Engineering and Technology Copyright. If accepted, the copy of record will be available at IET Digital Library". On acceptance, this may be changed to: "This paper is a preprint of a paper accepted by Journal and is subject to Institution of Engineering and Technology Copyright. When the final version is published, the copy of record will be available at IET Digital Library". The author may also post postprints of their work (reviewed, revised and accepted for publication by the Institution, but not the published PDF) on repositories, servers and websites of any sort, with appropriate copyright notice. "This paper is a postprint of a paper submitted to and accepted for publication in [journal] and is subject to Institution of Engineering and Technology Copyright. The copy of record is available at IET Digital Library." The postprint must be the author's version and not the Institution's version/PDF. The postprint must not be posted prior to publication of the paper by the Institution and when posted any preprint version should be removed.
7	Institute of Electrical and Electronics Engineers (IEEE)	Authors and/or their companies shall have the right to post their IEEE-copyrighted material on their own servers without permission, provided that the server displays a prominent notice alerting readers to their obligations with respect to copyrighted material and that the posted work includes the IEEE copyright notice. Electronic Preprints: Upon submitting an article to the IEEE for review and possible

		publication, the author must add the following notice to the first screen of any of his/her previously posted electronic preprint versions of the paper: "This work has been submitted to the IEEE for possible publication. Copyright may be transferred without notice, after which this version may no longer be accessible."
		When IEEE accepts the work for publication, the author must add the IEEE copyright notice to any previously posted electronic versions of the particular paper submitted and provide IEEE with the electronic address (URL, ftp address, etc.) of the primary electronic posting.
		When IEEE publishes the work, the author must replace the previous electronic version of the accepted paper with either (1) the full citation to the IEEE work or (2) the IEEE-published version, including the IEEE copyright notice and full citation. Prior or revised versions of the paper must not be represented as the, published version.
8	Institute of Physics Publishing (IOP)	Any prior or current availability in electronic form, including but not limited to access as a preprint server on the Internet, has been declared in an attachment before submitting the paper.
		Any use or publication of the material by the Authors or by authorized third parties shall acknowledge the copyright of the Publisher in an appropriate manner including the complete citation information of the Work as published in the Journal and legend [Journal title] © copyright (year) IOP Publishing Ltd.
		After publication by the Publisher, can be hosted on the Author's personal web site, provided that this is for non-commercial use and that the first page of such use or copy displays the citation information and

		the Publisher's copyright notice. Where the Author posts the Work to their personal web site then the Author should provide an electronic link to the Journal's web site. To post and update the Work on non-Publisher servers (including e-print servers) as long as access to such servers is not for commercial use and does not depend on payment of access, subscription, or membership fees. Any such posting made or updated after acceptance of the Work for publication shall include the citation information and copyright notice and should provide an electronic link to the Journal's web site.
9	Nature Publishing Group (NPG), A Division of Macmillan Publishers Ltd.	Does not require authors to sign away copyright to their articles. Instead, authors provide an exclusive licence and are free to reuse their papers in any of their future published work and on their own website. NPG journals are in World Health Organization's (WHO's) HINARI (Health InterNetwork Access to Research Initiative) scheme which provides free access to public institutions in developing countries. Nature and other NPG journals make selected articles freely accessible to users of SciDev.Net site, further increasing the influence of NPG publications and ensuring that scientists in developing countries can keep up to date with new information. Authors of original research papers published by Nature Publishing Group (NPG) will be encouraged to submit the author's version of the accepted, peer-reviewed manuscript to their relevant funding body's archive, for release six months after publication. In addition, authors will also be encouraged to archive their version of the manuscript in their institution's repositories (as well as on

		their personal web sites), also six months after the original publication,
10	Oxford University Press (OUP)	Prior to acceptance for publication, authors retain the right to make a pre-print version of the article available on personal website and/or that of employer and/or in free public servers of preprints with acknowledgement that the article has been accepted for publication in our Journal. No need to remove preprint versions after publication but these versions should not be updated or replaced with 'the finally published version'. Once an article is published, a link could be provided to the final authoritative version on the Oxford Journals Web site. Where possible, the preprint notice should be amended appropriately. Once an article is accepted for publication, an author may not make a pre-print available as above or replace an existing pre-print with the final published version. Detailed policies on the use of postprints for journals are available at the author self archiving policies link on individual journal homepages.
11	Palgrave Macmillan	Permit authors to archive the final draft of their manuscript (i.e. the version accepted for publication, following peer review and including any resultant revision, but prior to copy-editing by the publisher) on their own website or their institution's or funding body's online repository/archive. But the author's archived version of the manuscript, with proper acknowledgement and a link to the definitive published version on the Palgrave Macmillan Journals web site, must be delayed until 24 months after first online publication in the relevant journal.

12	The Public Library of Science (PLoS)	A complete version of the work and all supplemental materials, in a suitable standard electronic format is deposited immediately upon initial publication in of at least one online repository that is supported by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving. To provide open access, PLoS journals use a business model in which expenses of peer review, journal production, and online hosting and archiving are recovered in part by charging a publication fee to the authors or research sponsors for each article they publish.
13	Royal Society of Chemistry (RSC)	PDF of the article can be kept on the personal website(s) of the author(s) or via the Intranet of the organization(s) where the author(s) works.
14	Science	Permitted to post a copy of the accepted version of the Work on the author's personal website. After the article has been published in Science, authors may post the accepted version (the accepted version of the paper before Science's copy-editing and production) on their personal website on the condition that the reposted article includes a hyperlink to the Work on the Science web site as well as the following notice. "This is the author's version of the work. It is posted here by permission of the AAAS for personal use, not for redistribution. The definitive version was published in SCIENCE, {VOL#, (DATE)}, doi: {nnnnn} http://dx.doi.org/{nnnnnnn}".
15	Springer	Author may self-archive his/her version of the article on his/her own website and

		his/her institution's repository, including his/her final version; however he/she may not use the publisher's PDF version which is posted on www.springerlink.com. Furthermore, the author may only post his/her version provided acknowledgement is given to the original source of publication and a link is inserted to the published article on Springer's website. The link must be accompanied by the following text: "The original publication is available at www.springerlink.com". Springer operates a program called Springer Open Choice. It offers authors to have their journal articles made available with, full open access in exchange for payment of a basic fee ('article processing charge'). With Springer Open Choice, for the growing number of researchers who want open access, Springer journals offer the option to have articles made available with open access, free to anyone, any time, and anywhere in the world. If authors choose open access in the Springer Open Choice program, they will not be required to transfer their copyright to Springer, either.
16	Taylor & Francis	Authors are able to post a pre-print version of the Article on Internet websites including own home page, institutional website or subject pre-print server so long as a link is made on publication to the final published version of scholarly record on the journal's web page. Further, they are able to post, after a 12-month embargo (Science, Technology and Medicine) or 18-month embargo (Social Sciences and Humanities), author's revised text version of the final article after editing and peer review on own home page, institutional website or

		subject repository so long as a single link is made to the fully reference-linked version of scholarly record on the journal's web page.
17	Wiley	Pre prints may be posted as electronic files on the Contributor's own website for personal or professional use, on the contributor's internal university or corporate networks/intranet, or secure external website at the contributor's institution, but not for commercial sale or for any systematic external distribution by a third party (eg: a listserver or database connected to a public access server) with appropriate infomation about acceptance for publication/published before and after publication as the case may be with URL link to the journal homepage. The contributor should not update the preprint or replace it with the journal's published version.

Out of the publishers studied, it is found that ACS does not permit archiving of preprint or post print of papers. Apart from PLoS, two traditional publishers, Blackwell and Springer provides OA publishing options by making the author or institutions to pay for making the articles immediately available online in other repositories. Some publishers do not permit preprint archiving before publication. Many publishers permit only the authors/institutions/ funding bodies to archive the papers restrictively so that their revenues are not affected. Publishers want all the OA archiving to be for noncommercial purposes, generally done with the author versions properly displaying link to the formal version on publisher sites with copyright notice, some even insist for an embargo period so that the content will be exclusively available in their sites for a specific period after publication.

The SHERPA (Securing a Hybrid Environment for Research Preservation and Access) -RoMEO (Rights

eEtadata for Open archiving) Project of UK identified that 75 percent of 189 publishers studied formally allow some form of self-archiving of which only 25 percent (49) are commercial publishers.

8.5. OPEN ACCESS JOURNAL - HOW IT WORKS?

Any kind of journal publication involves cost for producing, whether it is traditional subscription based model or open access model, but they are totally different models. Open access journals are intended to be free for users, but they are not free for the publishers. A schematic diagram for publication of research papers is shown in Fig. 8.2.

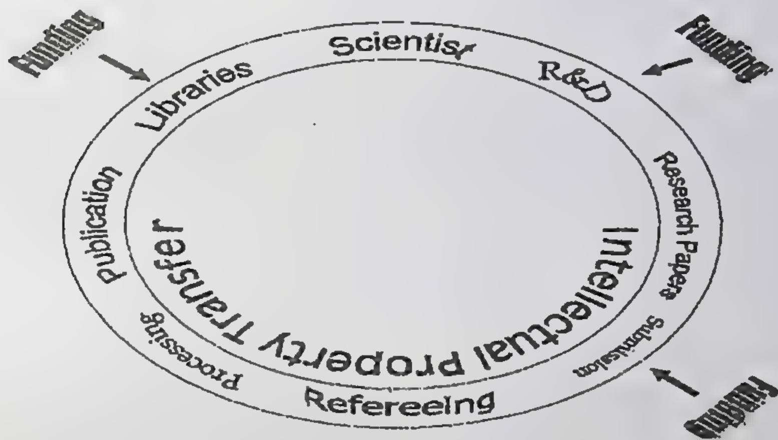


Fig. 8.2. Schematic Diagram depicting the Publication of Scientific Research Papers in Journals

The cost of producing open access journal basically involves – Managing peer-review and editorial control, and Providing high quality online access and technical support. How do then the open access publishers recover these costs? In open access publishing model the cost of publishing process has been reallocated from subscription fees to publishing fees, which means that the author or the research sponsors pays for the article to be published and it is not the reader who pays for the article. In other words we can say

that author is the publisher's customer and not the reader. The other sources of generating money for open access publishing are institutional membership fees, grants, donations, advertisements, etc.

8.6. SOME OPEN ACCESS JOURNAL INITIATIVES

Various initiatives to open access journals have been started at international and national level.

8.6.1. International

These are discussed below:

BioMed Central (http://www.biomedcentral.com): BioMed Central is an independent publishing house providing free access to peer-reviewed biomedical research. All the original research articles in journals published by BioMed Central are permanently available online without charge or any other barriers to access, BioMed Central publishes over 100 journals and other services. Authors retain copyright over their original research articles in journals published by BioMed Central and agree to allow free and unrestricted non-commercial use of the work by others. BioMed Central supports PubMed Central and other digital repositories, as well as encouraging self-archiving by authors.

Public Library of Science (PLoS) (http://www.plos.org): The Public Library of Science (PLoS) is a nonprofit organization of scientists and physicians, who are committed to making the world's scientific and medical literature a public resource, was founded in October 2000. PLoS has receives financial support in the form of grants from the Gordon and Betty Moore Foundation, the Sandier Family Supporting Foundation, the Irving A. Hansen Memorial Foundation, the Open Society Institute (OSI), and the Joint Information Systems Committee (JISC). PLoS also receives support through donations, sponsorships, and memberships from

private citizens, universities, and other organizations.

Directory of Open Access Journals (http://www.doaj.org) : Directory of Open Access Journals (DOAJ) provides access to quality controlled Open Access Journals. The Directory cover all open access scientific and scholarly journals that use an appropriate quality control system, and it is not limited to particular languages or subject areas. The aim of the Directory is to increase the visibility and ease of use of open access scientific and scholarly journals thereby promoting their increased usage and impact. DOAJ is hosted by Lund University Libraries Head Office. The project is funded by Open Society Institute - Budapest and also supported by SPARC – the Scholarly Publishing and Academic Resources Coalition.

Cream of Science (http://www.creamofscience.org): More than 200 top scientists in the Netherlands with 41000 publications are accessible for everyone. Cream of Science is supported by DARE programme and SURF programme The DARE programme is a joint initiative by all the Dutch universities and the National Library of the Netherlands, the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Netherlands Organization for Scientific Research (NWO). Its aim is to store the results of all Dutch research in a network of so-called "repositories", thus facilitating access to them. All the institutions involved do this in a similar way, but retain responsibility for and control over their own data. This material can then be made available in a range of ways and forms – online through personal or university websites, existing preprint servers or e-journals, or in traditional journals or books. Or even in new, yet to be developed means of academic communication. SURF is the Dutch higher education and research partnership organization for network services and information and communications technology.

8.6.2. Indian

Some of the indian initiatives are as under :

IndMED (http://indmed.nic.in) : IndMED is jointly setup by National Informatics Centre (NIC) and Indian Council of Medical Research (ICMR) to cater to the information needs of medical community of India. MedIND contains full text of 33 Journals Indexed in IndMED.

Indian Academy of Sciences (http://www.ias.ac.in) : The Indian Academy of Sciences was founded and registered as a society in 1934 with the aim to promote the progress and uphold the cause of science, both in pure and applied branches. The academy's objectives are met through original research and dissemination of scientific knowledge to the community via meetings, discussions, seminars, symposia and publications. The number of journals currently published by the Academy is eleven covering all major disciplines in science and technology, The Academy is considered as the single largest scientific publisher India.

Calicut Medical Journal (http://www.calicutmedicaljournal.org) : Calicut Medical Journal is an Open Access Medical Journal, supporting the initiatives to provide free access to scholarly communication on the internet. This exclusive online journal is published by the CMC Alumni Association. All content are openly and freely accessible. It provides hyperlinks to related resources on the web including full text references.

Online Journal of Health & Allied Sciences (http://www.ojhas.org) : The Online Journal of Health & Allied Sciences is a medical journal from India. The journal brings the vast potential of the Internet to the doorsteps of the biomedical fraternity for publishing various topics of common interest. All articles published in OJHAS can be printed by readers as HTML or PDFfiles. OJHAS is available online for

free to all readers. No pre-registration is required and there are no 'logins' and 'passwords'.

All articles accepted for publication in OJHAS after peer review are published free and no 'publishing fee" is charged from the authors. The copyright of all the articles published in OJHAS lie with the authors. The articles can be copied, transmitted, stored, reproduced without permission provided the access to publication is unrestricted and due acknowledgement and hyperlink to the source from OJHAS is provided.

8.7. TRENDS AND IMPACT OF OPEN ACCESS

The trends of Open Access opened the avenues of digital preservation. Many single entity organizations were amalgamated with each other through network to form a broad platform in the digital arena and formed partnership for developing scholarly available journals and articles for a wide use of the same by the scholars for exploring their knowledge and research value. Many Libraries, Digital Library Research Group, National Library, Commercial Companies were among them who volunteered themselves to be a part of providing the information and opened gateways on web for electronic access of information. In June, 2003, ISO Standard Certification was bestowed upon the OAIS Reference Model and this enthralled the archives to use the OAIS terminology and the conceptual model.

The Open Archival Information System Reference Model has been widely acknowledged, acclaimed and adopted in the global scenario as a positive means of transposing with evaluated and filtered electronic information. Efforts were underway among some data archives to minimally ingest Submission of Information Packages (SIP) and to spawn Dissemination Information Packages (DIP) so as to respond to the spirit of the standard.

The trend of the application of Open Archives has resulted the organizations to focus primarily on capturing and acquiring digital information, rather than preservation or permanent access. Many of the institutional repository activities are committed to long term preservation and access in relation to the technical and metadata information.

The efforts for digital depository legislation are also gaining momentum by the Open Access. The digital deposit legislation are now a days the most accepted parameter on the basis of which, pilot projects are involving around national libraries and profit making commercial organizations.

It is also visualized that the advanced technologies brought a sweeping change in the information scenario of scholarly communications through Open Access on the web platform and this could fulfill the quench of the information seeker with overwhelming sources of information. Science stream received a tremendous impact due to Open Access and this is revealed from the Directory of Open Access Journals which is maintained by Lund University Libraries being sponsored by the Information Program of the Open Society Institute and SPARC (Scholarly Publishing and Academic Resources Coalition). This includes over 350 open access journals in 15 subject categories. The scientific categories include Agriculture & Food Sciences, Biology & Life Sciences, Chemistry, Health Sciences, Earth & Environmental Sciences, Mathematics & Statistics, Physics & Astronomy and Technology & Engineering. The journals available on Open Access are alternatives to the towering expensive profit-making journals such as Bio-Med Central, SPARC partners, and some institutional repositories in an assortment of disciplines.

The Social Science disciplines are also not exempted from the purview of Open Access podium, where a number of journals, conference proceedings, reports, updated

information, developments, innovative learning courses are available in electronic form and almost free of cost barring few of them where, the publishers use to charge price for accessing to the full text articles from a variety of journals.

Budapest Open Access Initiative (BOAI) of 2002 shaped a mile stone in the history of Open Access and this idea was accelerated by leading organizations and publishers for disseminating of information through e-prints for a greater scholastic consequence. The term Open Access has been coined in various ways as follows keeping intact the sense, purpose and plan – Free On-line Scholarship; Scholarly communication Initiative; Immediate free Web Access; Refereed Literature Liberation Movement; and Intellectual Property conservancy etc.

Now, we can see a good number of open jounarls in different fields for the user community.

8.8. IMPLICATION OF OPEN ACCESS FOR LIBRARIES

Open access has many passionate supporters because of its promise to make scholarly information more readily available, slow the commercialization of scholarly communication, and reduce the cost of scholarly publications. The open-access initiative has been at the forefront of countless discussions regarding the future of scholarly communication because open access promises to transform the future. This transformation will affect libraries as well because they play a critical role in the scholarly communication process.

Libraries intent on providing access to scholarly information cannot afford to ignore open-access venues. In order for libraries to be proactive rather than reactive to the changes open access will bring, a closer examination of the current and impending changes is imperative. It is recognized that open access has the potential to affect the entire chain

of scholarly communication; however, the effects of open access on libraries are discussed here.

To understand the effects of open access on libraries, the likelihood and degree of success of the open-access movement need to be considered. There has been much debate about if and to what extent the open-access movement will succeed. The potential future of the movement can be addressed in three broad scenarios. In the first scenario, open access fizzles out and fails; in the second, it succeeds by completely surmounting the current subscription model; in the third, it succeeds partially and coexists with the traditional subscription model.

The Movement Fizzles Out : In the first scenario, the open-access movement fizzles out after the current enthusiasm wanes. There are several possible reasons for this, including the perception on the part of authors that the open-access movement is not in their best interest. This is critically important because it is largely authors, through their decision to publish in open-access venues, who will determine the success of the movement. Authors may resist the movement because the prevalent funding model shifts the cost of the publication to them – generally referred to as the author-pays model. The perceived lack of prestige of open-access journals and repositories also may contribute to authors foregoing open-access options. In this scenario, the movement basically dies because authors and institutions, more comfortable with the traditional model, fail to embrace the open-access movement.

This scenario seems unlikely for a number of reasons. It assumes that authors will not take advantage of the opportunities made available by open access, such as authors' retention of copyright, rapid dissemination of research, and impact advantage. Moreover, the demise of the open-access model would mean that governments, grant-

funding agencies, and universities passively continue to support the profit margins of commercial publishers. Because funding agencies generally desire the results of funded research to be widely disseminated, some of them have seriously considered the possibility of requiring authors to publish research articles they fund in open-access venues. Based on these two factors alone, the supposition that the open-access movement will fail and disappear from the scene seems unrealistic.

The Movement is an Overwhelming Success : In the second scenario, open access succeeds so overwhelmingly that the traditional subscription model succumbs to its advantages and disappears. Researchers en masse no longer agree to sign away the rights to their work for someone else's profit, refuse to accept the traditional lag time from finished research to published paper, and reject the current boundaries that limit dissemination of important and timely information. In addition, organizations and funding agencies refuse to continue to subsidize the nonstop inflationary burden imposed by the traditional model.

Although this scenario would appeal to many individuals and organizations, it also seems unlikely to happen. Although both authors and institutions may be ready to take advantage of open access, the fact that the traditional model is well established and reputable is likely to keep the open-access movement from completely succeeding. For example, publications such as *Brain, Biochimica et Biophysica Acta,* and *Cell* currently enjoy the advantage of a long record of publication and a reputation for publishing the highest-quality research in their fields. The superior reputation of such leading journals almost guarantees they will continue to find authors who are high-quality scholars as well as customers who are willing to pay to read this research.

Moreover, devising a sustainable and affordable model

to fund open-access serials remains unresolved. Although the evidence suggests that open-access publications are considerably less expensive to fund than the traditional subscription model, journals in some disciplines such as the humanities and social sciences remain very inexpensive. The open-access model cannot dislodge these titles merely on the basis of a cost advantage. Given all these factors, the existence of open access should not be interpreted as the inevitable demise of the traditional model.

The Movement is a Mixed Success : In this scenario, the open-access movement will continue to succeed but will not cause the complete eradication of the traditional model. Instead, both the open-access and the traditional publishing models will compete for authors and resources concurrently. In many ways, this is the present situation – both open-access venues and subscription journals coexist.

Many reasons suggest that this scenario is likely to endure. The traditional publication model has many players that have a vested interest in its continuation. In addition, this model reaps ample profits, which help to keep it functional. Commercial, academic, and other publishers may have to change their pricing structure, improve efficiency, and tweak operations, but there is little reason to believe they do not have the necessary flexibility to compete with open access. Also, the attraction of well-established titles will remain in place and such titles will continue to attract high-caliber authors, despite the growing respect afforded to some open-access journals. On the other hand, open access offers new and less restrictive publishing venues for scholars. In addition, some funding agencies require that research performed with their funds be published or made accessible in open-access forums. Open access may prove to be a healthy catalyst for change, rather than serving as the device that topples the entire traditional publishing edifice

It appears that scenarios one and two are unlikely to take place whereas the third scenario, called mixed open access (MOA), is already beginning to take place. For example, universities such as CalTech, Boston College, and MIT have created institutional repositories for faculty wherein preprints, postprints, and data sets may be found; open-access journals are indexed in premier databases such as PubMed, PsycInfo, and Chemical Abstracts; and some university libraries are beginning to include items such as the DOAJ or preprint servers such as ArXiv (physics) in their list of resources. It is too early to determine to what degree the traditional publishing model and open access will coexist. Will this environment still heavily favor traditional publishing, or will a more equitable mixture become the norm? The proliferation of open-access journals and repositories in conjunction with the continued existence of traditional venues has many implications, and examining how MOA affects libraries is of critical importance now.

The most dramatic challenge that open-access resources present to libraries is the fact that these resources do not require the patrons to use the library. Patrons may go to the Web and simply use the open-access resource, completely bypassing the library. This is a striking contrast to the situation that existed when libraries built a physical collection of resources that required patrons to come to the library to use them. In the electronic era, patrons do not have to come to the library for many resources, yet they rely on remote electronic resources that libraries select and fund and to which libraries provide access. The advent of the Internet and search engines such as Google has eroded patrons' reliance on libraries by making it possible for patrons to find large quantities of information, especially the sort referred to as "ready reference," without using the library. Similarly, open access makes another large, yet more scholarly, class of materials available for free on the Web, bypassing the library

to find an ever-growing proportion of the available information on the Web. In this way, libraries could lose their central place in the scholarly research process.

MOA also presents opportunities for libraries to look beyond their traditional roles of building collections and subscribing to remote resources. Libraries need to think of themselves as mediators between their patrons and the ever-expanding and increasingly complex world of information. With regard to open-access resources, libraries can serve their patrons in a number of ways. Patrons may be unaware of the existence of open-access resources, so librarians can assist them by identifying the resources that meet patron needs. One way this can be accomplished is by providing patrons with indexes and databases that include open-access resources. For example, EBSCOhost recently began providing access to selected Directory of Open Access Journals (DOAJ) titles. Another respected database, PubMed, indexes select open-access journals as well. It is certain that more indexing and abstracting services will follow suit.

Despite the likelihood that more indexers and aggregators will add open-access resources to their databases, libraries should not passively rely on them to include these titles. As with traditional journals, librarians must be aware of what open-access resources are included in any particular database. Libraries also must maintain communication with aggregators so that they know the aggregators' inclusion policies and how aggressively a particular aggregator searches for and includes open-access items. The overlapping and fluctuating coverage of traditional resources provided by indexers and aggregators already provides ample reason for libraries to evaluate what they buy more carefully, but the advent of the MOA environment makes this task urgent and complex. Moreover, libraries cannot rely on indexers and aggregators to lead their patrons to every relevant open-access resource. It is likely that some open-

access journal titles will not be included by any indexer or aggregator. For example, *Magnetic Resonance in Solids, Electronic Journal* is a peer-reviewed electronic journal pertaining to basic research in magnetic resonance of solids and related phenomena and it is not indexed in the DOAJ, the most likely database to contain any open-access title. Yet, this item may still be of interest and use to patrons; it is obvious that libraries must take the initiative to add it to the library catalogue themselves. Indexers and aggregators may be less likely to provide access to the information in institutional or discipline-based open-access repositories. Because some of the most cutting-edge information is included in these resources, a concerted effort must be made to alert patrons to these open-access venues. Librarians will have to work hard to identify these important and useful resources.

Another challenge for libraries operating in an MOA environment is to monitor the quality of the open-access resources to which their patrons are directed. Even a relatively "respectable" list of open-access journals such as DOAJ will include journals of widely differing quality in terms of both content and editorial control. Librarians should identify a specific open-access journal as a high-quality product before directing their patrons to it. In fact, as with print journals, the question of quality continues to be an issue. Although many open-access publishers are striving to retain a stringent peer review or editorial component within their publication process, open access is still a new publication model. Some also argue that the prevailing author-pays model provides less incentive for open-access publishers to apply rigorous quality control standards. The issue of quality is even more critical in the case of discipline-based, institutional and, in particular, personal repositories. Although most discipline-based and institutional repositories have policies or guidelines in place that govern what types of materials are acceptable for

submission, there are no controls or rules to dictate what types of resources may be included in an individual's personal repository. In theory, anyone could make any type of material, both quality and not, available on the Web via a repository.

Meeting the implications of MOA also will mean more work for bibliographers. In the MOA environment, bibliographers will have to work as diligently as ever to identify, evaluate, and select those resources that should be purchased with library funds. Moreover, they will be responsible for identifying open-access resources that will be of interest to their patrons. In addition, bibliographers will be responsible for finding the repositories that need to be included in the library's catalogue, database lists, and so on. To do these things effectively, bibliographers must stay abreast of trends in their disciplines and maintain an awareness of how each discipline views and uses open-access items. To keep track of open-access venues, bibliographers need to use open-access-specific tools or databases such as DOAJ (http://www.doaj.org/), OAIster (http://oaister.umdl.umich. edu/ o/oaister/), Sherpa's "Publisher copyright policies & self-archiving," as well as tools such as Google's Open Access Resources Directory (http:// directory. google.com/Top/Reference/Open_Access Resources/) or the Google Scholar platform (http:// scholar.google.com/). In addition, sometimes bibliographers must simply surf the Web for this information. These tools will help bibliographers to make decisions about what items should be used or included, recommended or not recommended, based on the discipline. This will be even more challenging and time-consuming if open-access publications and venues continue to multiply at their current rate.

Although identifying high-quality open-access resources is critically important, these resources will not be useful to patrons unless libraries communicate their existence and usefulness and integrate them into their virtual collections.

Librarians can alert patrons to open-access venues in a number of ways, including adding an open-access resource in the library catalogue or to the library's list of serials. When open-access resources are included in the catalogue, patrons will not need to wonder whether the material is available in a traditional print or electronic subscription or via open access. The catalogue can provide them with just one place to look for this information. Librarians also should include appropriate open-access resources in pathfinders and research guides because these are other important ways of directing patrons to relevant, high-quality information.

When open-access resources have been included in the library catalogue and other library products, the information about these resources must be maintained. The difficulty of maintaining open-access resources in the library catalogue and other resources should not be underestimated. To begin, it is reasonable to assume that open-access journals will be at least as prone to name changes, splits, mergers, URL changes, changes in subject coverage, and cessation as their print subscription counterparts. It also seems likely that repositories of all types may be subject to similarly frequent transformations. The catalogue and other library resources will need to be updated regularly to reflect these changes.

Open-access resources also share with other electronic publications a host of characteristics that make them difficult to maintain in the catalogue. The challenge of maintaining the currency of URLs, which are prone to change or disappear, should be obvious. Libraries are attempting to deal with this problem locally through the use of link checkers and collectively by means of the CONSER PURL (Persistent Uniform Resource Locators) project. Dealing with title changes in electronic journals also has proved to be a problem. With print publications, changes in title and so on are caught when an issue is checked in and a cessation is caught when an

issue fails to arrive. Electronic subscriptions offer fewer routine methods of catching these changes. Even greater problems can occur when electronic publishers, both traditional and open access, decide to change the title of a journal and then apply that title change to all the earlier issues of the title on their Web site. Should the cataloger use successive catalogueing entry (entry under each title the journal has had) or latest-entry cataloguing (entry under the last title) to handle such a journal? Although it is tempting to treat this type of journal as an integrating resource and use latest-entry cataloguing, the survival of the earlier title in patron citations and in article-level running titles and so on presents problems for this approach as well. The simultaneous existence of multiple formats of the same journal, including print and microform and different electronic journal file formats and aggregator versions, creates additional troubles. The question of how to provide the necessary information about these multiple versions and the relationships among them without thoroughly confusing the patron continues to be a problem for the cataloging profession. Finally, ensuring that the catalogue contains accurate ISSN information for electronic journals has become an important challenge. ISSN numbers have become a critical piece of information because they are often used by various technologies to link databases to the online catalogue and to each other. However, journals that lack ISSN or have different ISSNs for different formats can make the provision and maintenance of the appropriate version of these important identifiers difficult.

All the difficulties of adding electronic resources to the catalogue apply to open-access journals as well, and these resources are likely to present additional unique problems. Electronic journals purchased by subscription are not checked in, bound, or handled physically in the same way that print journals are, but they still require attention from library staff because licenses must be negotiated and renewed,

passwords or IP ranges tested, and authentication software maintained. All these processes provide the library the opportunity to evaluate the availability and scope of these titles and ensure that bibliographic information such as the title continues to be accurate. In contrast, libraries only have to link to open-access titles once. In this way, open-access resources are somewhat like free Web sites. When they are in a library catalogue or other finding aid, they can easily morph into other forms without the library's knowledge. Therefore, to maintain these resources properly, libraries will need to adopt mechanisms that regularly check these resources to ensure that the information provided is up to date and accurate. This active maintenance routine is bound to be more complex and time-consuming than the more passive methods that have worked for more traditional resources.

The open-access business model also may not give publishers incentive to actively cooperate with the library or with serials vendors who may be acting on behalf of groups of libraries. Libraries are one of the most important customers under the traditional subscription model, and so journal publishers have an interest in making their publications easy for libraries to use. With authors as their customers, open-access arrangements may not have the same incentive to cooperate. For example, will open-access journal publishers have the same incentive to work with libraries to solve problems such as changed titles, URLs, cessations, and downtime that sometimes affect electronic journals? The need for some kind of relationship between publishers and libraries, though perhaps not as critical, will still be necessary in an open-access environment.

The hybrid character of the MOA environment presents other serial maintenance challenges for the library. A library might contain parts of the same journal in print and microform, provide access to a part of the journal's back file through an

open-access archive, and provide access to issues through an aggregator. Access for a particular resource may undergo constant change as license agreements are renegotiated, embargoes are put into effect, and publication strategies evolve. Keeping up with this constant change, while making all these variations in access transparent to the patron, is an additional maintenance challenge for the library.

Another factor that may increase the difficulty of serials maintenance in the MOA environment is the increase in the number of titles that must be maintained. In the print/electronic subscription environment, the number of titles is limited by the library's budget. In the MOA environment, libraries will have to maintain both their paid subscription titles and every open-access title added to the catalog. Because libraries do not pay for open-access titles, there is no fiscal limit to the number of titles that can be added. Therefore, as the number of open-access resources grows, the library may find itself keeping track of many more open-access titles than subscription titles. This will obviously increase the workload of serials maintenance. An increase in the number of serial titles also may result in an increased need for products such as federated search engines and open URL link resolvers. These can help the patron more easily navigate among resources of a large and complex MOA environment. However, these products also generate maintenance issues of their own because they rely on complex database tables containing detailed information about every title and database of concern to the library. These tables require regular and extensive maintenance.

The maintenance involved with providing patrons access to MOA resources will be a daunting challenge for libraries. However, there are some ways in which open-access resources will require less maintenance than traditional subscription resources. Open-access journals do not require subscription funds or license agreements.

Libraries do not have to check in or claim these publications to ensure that they have received what was promised. Furthermore, unlike print materials, libraries do not have to physically process, shelve, bind, or withdraw these resources. The resources saved by not having to perform these tasks could be directed toward the new tasks associated with MOA.

By making open-access resources available through the library catalogue and other resources, the library will be able to make the MOA environment almost transparent to the patron. MOA also has significant implications for public services librarians. Most library patrons currently are unaware of the wealth of information available in the open-access environment. This is an important gap that information literacy instruction can fill. As their awareness increases, patrons will expect librarians to be able to help them navigate a chaotic and complex MOA environment. They are especially likely to need help using open-access repositories if they have not previously used these resources. Patrons also are likely to need help evaluating the quality of open-access information because quality can be uneven. In order to fulfill this role effectively, public services librarians will have to become educated about open access. Bibliographers, who should be actively investigating open access in their disciplines, will have a role to play in this training process.

As a result of their traditional role as storehouses of scholarly information, libraries have a natural role in the creation and operation of institutional repositories. Although responsibility for managing campuswide policies and procedures, managing the computational and technical requirements of repositories, and exercising editorial and quality control is unlikely to fall to libraries alone, libraries can be responsible for some repository tasks. For example, it is natural for the library to assume responsibility for organizing the information within the institutional repository. The Open Archives Initiative Protocol for Metadata Harvesting provides

one framework for organizing information within repositories. Librarians also may play an administrative role. For instance, because of their experience with copyright issues, librarians are well suited to assist authors in obtaining permission to include previously published materials in the repository. These natural relationships foster a close association between the library and an institutional repository.

The library's involvement in the operation of institutional repositories suggests another new role. Institutional repositories and open-access venues in general are having some difficulty attracting authors to publish on their sites. One role that libraries may assume is to encourage open-access publication by subsidizing authors' fees in open-access venues. Some trailblazing libraries have already begun to fund open-access publication. Funding open-access publication is a new twist on the library's traditional role as the institutional purchaser of scholarly information. In addition, this funding role will help keep the library at the center of the scholarly enterprise. As an added benefit, encouragement of open-access publication with library subsidies may add pressure on commercial publishers to control their price increases. However, subsidizing authors' publication costs also may be risky for libraries because libraries may not receive any additional funding to cover the cost of this activity. In this case, these subsidies will have to be funded with money that would otherwise be used to build library collections.

The overall effect of MOA on library budgets is uncertain at this point. The number of both monographs and subscription-model serials being published continues to increase. At the same time, both monograph and serial inflation continues at a rate higher, while library collection budgets remain flat. If libraries begin to subsidize open-access publication, this will create yet another strain on the budget. These trends are a real threat to the ability of the library to operate within its financial constraints. But, if open access

becomes a catalyst for change and subscription costs decrease, the potential benefits are obvious. This would be a great benefit to libraries because serials inflation has done more damage to library budgets than any other trend. If serials costs decrease, libraries should take steps to repair the damages that decades of unchecked inflation have wrought on collections. Monographs, audiovisuals, data sets, and primary sources are long-neglected parts of library collections. Those libraries that succeed in addressing these problems are sure to make themselves more relevant to their patrons.

So, the evidence suggests that although open-access sources are multiplying at a rapid pace, the traditional model will not disappear. In all likelihood, the traditional model will coexist with the open-access model for years to come. This is especially true of journals in the humanities and social sciences, which are moderately priced and are competitive with the open-access model from a financial perspective. The implications for libraries and their organization are significant. The fact that open-access resources are accessible without the library's intervention suggests that academic libraries will have to reconsider strategies to remain relevant to their patrons.

It is also evident that library operations were built on a paradigm of scholarly communication based on printed sources. With the onset of electronic publications, and now open-access publications, this paradigm is bound to change. It is obvious that the changes in scholarly communication will force libraries to change as well. So focus here is on the difficulties and uncertainty of a changing environment but, rather, to alert the profession to the opportunities and challenges these changes will bring. Although many of the issues discussed here have been present in libraries since the advent of electronic publications and the Internet, the emergence of the open-access movement exacerbates the

urgency of issues such as archiving, data stability, cost containment, and so on.

Finally, it is worth noting that the emergence of the open-access initiative shatters the myth that there are no alternatives to the traditional publishing model. What libraries do with the opportunities that the open-access movement offers will depend on librarians' resourcefulness and creativity. And, in this sense, the changes open access elicits are empowering.

8.9. OPEN ACCESS ARCHIVES OR OPEN ACCESS REPOSITORIES/INSTITUTIONAL REPOSITORIES

The Open Access Archives or Open Access Repositories accumulates information through electronic form which does not execute peer review, only excepting the contents freely available in the global sphere. Rather, increasing open access movement is opening alternative channels for the dissemination of scholarly work and feeding the growth of Institutional Repositories (IRs). Many academics still prefer to publish their research in books and journals, they are disseminating their unpublished work more frequently through open-access, digital outlets. This work, often called "grey literature", includes conference presentations, technical reports, and preprints as well as datasets, supplements to published work, and electronic theses and dissertations. 'Institutional repositories are digital collections which capture and preserve the intellectual output of a single or multi-university community, with the aim of increasing competition and collectively reducing the monopoly power of journals, thus bringing economic relief and heightened relevance to the institutions and libraries that support them'.

An institutional repository consists of formally organized and managed collections of digital content -generated by faculty, staff and students at an institution. The content of

these repositories can be available for integration with on-campus library and course management systems, and can also be made available to colleagues and students at other institutions, as well as to the general public. It is defined to be a web-based database (repository) of scholarly material which is institutionally defined (as opposed to a subject-based repository), cumulative and perpetual (a collection of record); open and interoperable (e.g. using OAI-compliant software); and thus collects, stores and disseminates (is part of the process of scholarly communication). In addition, most would include long-term preservation of digital materials as a key function of IRs.

Institutional archives or repositories are developed, maintained, and administrated by an organization or scholarly society, commonly by institutions, such as, Universities, R&D establishments, Libraries, Museums, etc. to offer universal e-print access facilities stored in their servers. Scholarly Publishing and Academic Resource-Coalition (SPARC) has defined 'Institutional Repositories' as 'digital collections that capture and preserve the intellectual output of single and multi university community'. Similarly, Lynch is of the opinion that, "a university based institutional repository is a set of services that a university offers to the members of its. community for the management and dissemination of digital materials, created by the institution and its community members". Hence, Institutional Repositories are an effective organizational commitment for long-tern preservation as well as access or distribution for digital materials and support by a set of Information Technologies.

Institutional repositories are focused on the collection and preservation of all types of research literature, scientific data, learning objects, administrative records, multimedia and any other type of collection. Thus, Institutional e-prints repositories are the globally searchable system of distributed interoperable repositories which will impact on the scholarly

communication by facilitating dissemination of research result and the e-print institutional repositories are worked under OAI-PMH umbrella. A growing number of institutions and consortia are actively engaged in setting up and running institutional repositories.

8.9.1. Purpose of Institutional Repositories

The origin of the archives lies in the increasing interest in alternatives to the scholarly publishing paradigms. According to Crow, Institutional Repositories have two main rationales; such as:

- **Scholarly Publishing Paradigm:** Institutional Repositories centralize, preserve, and make accessible by institution's intellectual capital and they will form global system of distributed interoperable repositories that will help facilitate reform of scholarly communication system.
- **Institutional Visibility and Prestige:** Institutional Repositories serve as indicators of academic quality by capturing, preserving and disseminating the collective intellectual capital. The intellectual product created by the researchers, faculty, and other knowledge workers of an institution, deposited in the Institutional Repository; demonstrates its scientific, social and financial value.

Thus, the Institutional Repositories measure institutional productivity and prestige and increased visibility of high quality of scholarship.

8.9.2. Elements of Institutional Repository

An institutional repository is a digital archive of the intellectual product created by the faculty, research staff and students of an institution and accessible to end users both within and outside the institution. According to Crow the

content of institutional repository carry the following elements:

- **Institutional Defined :** Institutional repositories capture the original research and other intellectual property generated by an institution's activity in many fields. In this way, it represents the historical and tangible intellectual assets and output of and institution.
- **Scholarly Content :** Depending on the goals of establishment of institution, an institutional repository could contain any work product generated by the institutional faculty, student, non-faculty, researchers, and staff. This material can be such as electronic portfolio, teaching materials, annual report, video recording, computer programmed, datasets, photographs and digital materials etc.
- **Cumulative and Perpetual :** The role of Institutional Repository for scholarly communication is that the content collected is both cumulative and maintained in perpetuity; in this regard it has two roles:
  - In Institutional Repository what ever is deposited is protected under legal right to avoid plagiarism, copy right infringement, etc. to sustain perpetually. Hence, the cumulative nature of institutional repository is scaleable.
  - Institutional repository aims to preserve and make accessible digital content on a long-term basis. Digital preservation and long-term access are inextricably linked.
- **Open and Interoperable :** The institutional repository must provide access to broader community, user outside the institution must be able to find and retrieve information from the repository, means institutional repository must be open access. Therefore, the institutional repository system must be able to support

interoperability in order to provide access with the help of search engines and other discovery tools.

8.9.3. Success of Institutional Repositories

The success of institutional repository depends upon the culture of the organizations where collaboration and trust exists. In a competitive environment where cooperation and trust are not nurtured, building a repository will be a tough task. Repository advocates an early decision on the purpose and scope of the repository and then communication of them to all affected parties. For some institutions, community-based repositories will work well, whereas for large and complex institutions it will need consensus on key issues and technical standards. A repository may be limited to self-archiving by authors or may include the intellectuals' output and administrative documents for the whole institutions, which provide the means for unearthing these treasures and bringing them to light. Besides, librarians and administrators responsible for operating and maintaining repositories need to ensure that all legal requirements must be met. These may include appropriated softwares and content licenses. Most commonly saying, the success of building a repository depends upon :

Comprehension : It implies that all members of the team must share a common vision and understanding of the purpose and scope of the repository.

Collaboration : It involves thinking and working together, with different people contributing their different talents; and working with others to solve problems and making important decisions.

Context : Each person has a unique mind-set based on background, education and experience. The context implies each person's view and working environment. Thinking and working together in a non-threatening

atmosphere helps people to integrate other people's contexts into their own thinking.

Change : The change is the way in which repositories are disseminated, preserved and published. This change requires people of the institutions to deposit their research results, datasets and other materials in the repository. In corporations, management may require staff to deposit items, such as strategic plan, marketing plan and working papers.

Caring : It is the motivation of the desire to share research results and joint scholarly endeavours, preserve history and provide knowledge and information needed for future generations to learn.

Commitment : The commitment is the understanding of the higher authorities that the repositories will grow and require support and funding in perpetuity.

Creativity : The creativity involves imagination and the ability to visualize a new way of doing things.

Competence : This is to the knowing how to make the repository work for all its constituents. Librarians and archivists need to demonstrate their competencies by knowing about the software, hardware, networking and the standards need to make the repository serve every one.

The current developments in institutional repositories have tried to explain why these are so deeply and strategically important to the enterprises of scholarship and higher education. The perspective has been largely a near-term one Not every higher education institution will need or want to run an institutional repository, though ultimately almost every such institution will want to offer some institutional repository services to its community. Although current focus is on creating IRs in institutions of higher education, they can be set up by any Institution, including public or private R & D laboratories, interested in improved preservation organization

and dissemination of its intellectual output.

Some of the international and national initiatives are discussed below :

8.10. INTERNATIONAL INITIATIVES ON OPEN ACCESS REPOSITORIES

Open Access/Archives main aim is to facilitate free flow of refereed literature among researchers in different disciplines over the Internet. The Registry of Open Access Repositories is promoting open access to the research literature pre- and post-peer-review through author self-archiving in institutional eprint archives. The registry has two functions: (1) to monitor overall growth in the number of eprint archives and (2) to maintain a list of GNU EPrints sites (the software Southampton University has designed to facilitate self-archiving). As per the registry the world scenario of open access repository for top 20 countries is given in Table 8.4.

Table 8.4. Open Access Repository : (Top 20 Countries in terms of No. of Repositories Developed)

Sl. No.	Country	Repository/ Archives	Records
1	United State	192	1065694
2	United Kingdom	74	85071
3	Germany	64	170001
4	Brazil	44	120403
5	France	33	115748
6	Canada	32	27405
7	Sweden	26	32636
8	Australia	26	70937
9	Italy	24	14169

10	India	22	12180
11	Netherlands	19	316684
12	Japan	16	256892
13	Spain	14	7877
14	Belgium	10	6446
15	Denmark	8	6869
16	Mexico	7	131630
17	China	6	4911
18	New Zeland	6	457
19	Switzerland	6	97716
20	Portugal	5	4762

Now there are few such initiatives have made their presence on the net, A brief description and links for some of such important OA initiatives are given below.

Budapest Open Access Initiative (http://www.soros.org) : The initiative has been signed on 14 February 2002 by 3409 individuals and 267 organizations as Budapest participants. The number is growing from around the world who represent researchers, universities, laboratories, libraries, foundations, journals, publishers, learned societies, and kindred open-access initiatives. The Budapest initiative invites the signatures, support, and participation of the entire world scientific and scholarly community.

Scholarly Publishing and Academic Resources Coalition (http://arl.org/sparc) : SPARC, the Scholarly Publishing and Academic Resources Coalition, is an alliance of universities, research libraries, and organizations built as a constructive response to market dysfunctions in the scholarly communication system. These dysfunctions have reduced dissemination of scholarship and crippled libraries. SPARC serves as a catalyst for action, helping to create

systems that expand information dissemination and use in a networked digital environment while responding to the needs of academe.

Electronic Publishing Trust for Development (http://epublishingtrust.org) : The EPT was established in 1996 to facilitate open access to the world's scholarly literature and to support the electronic publication of reviewed bioscience journals from countries experiencing difficulties with traditional publication. The Trust focuses on the biological sciences which, in such fields as infectious diseases, public health, tropical medicine, biodiversity, environmental and agricultural sciences, require a global picture. Local scientific information is critical, particularly in the case of human, animal and plant disease surveillance and conservation.

8.11. OPEN ACCESS INITIATIVES IN INDIA

In India, there is a greater opportunity for open access publishing. There are many noncommercial research and development institutions, both academic and research laboratories are functioning in India. For example, there are approximately 300 Universities that offer both graduate and research programs. There are also many R&D laboratories operating within scientific agencies of the government, which cover domains like industrial research, defence research, agricultural research, medicine, ecology, environment, information technology, space, energy and ocean development, etc. These institutions, which produce research work, could potentially convert their data into online assessable material. Many of these institutions, and also several professional societies, publish science journals. Tools like the Open journal System could help many of these journals to come online in an open access environment. Technical reports produced by many R&D projects, laboratories, and other institutions would also be candidates for providing open access. Theses and dissertations at

universities, conferences, and research paper where preprints or post prints, unpublished research findings, data, or standards are candidates for open access publishing in India and in other countries. The following examples of open-access initiatives in India are drawn from scholarly science journals, theses, institutional archives, books, data and open access of the metadata level, and open access at portal and gateway services.

Indian Academy of Sciences established in 1934, is currently digitizing all the archival issues. Its issues are available online, which include – journals, and the proceedings. Vidyanidhi meaning the *"treasure of knowledge"* in Sanskrit is another open access initiative that is trying to digitize and host theses and dissertations. It operates from the University of Mysore and is a part of the global electronic thesis and dissertation initiative.

Other institutions have also put their intellectual online as well, including the Indian Institute of Technology (IIT) in Delhi. The E-print archives of the Indian Institute of Science is an online digital repository of research papers, both preprints and post prints, technical reports, unpublished findings, and journal articles of the faculty. It was set up using eprint open-source software, and is registered in the e-prints registry. Eprints@iisc is now a part of the worldwide institutional e-print archives. The E-prints archives allow the faculty and students to submit their publications electronically to the campus network. Although depositing is not allowed from outside the campus, access is allowed from anywhere on the Internet.

The Universal Library is another interesting project, which is funded by the Office of the Principal Scientific Advisor to the Government of India and is hosted by the Indian Institute of Science (IISc) in collaboration with the Carnegie Mellor University in the United States. The goal of this project is to

provide a free, searchable collection of million books that are no longer copyrighted.

There are some examples of initiatives and provide open access to data as well. The **National Chemical Laboratory (NCL)** is a national research laboratory in India that provides free access to their data, including data from the National Collection of Industrial Micro-organisms and the National Centre for Biodiversity Informatics.

There are also open access initiatives at the metadata level. **INDMED**, at the National Informatics Centre in Delhi, is a bibliographic database of Indian biomedical literature and indexes 75 Indian Journals. The University Grants Commission is the body that coordinates all Indian university education. It supports the information library network program **INFLIBNET** that marks meta databases related to R&D projects available on the Web.

The **Council of Scientific and Industrial Research** is responsible for scientific industrial research in India and has a unit for R&D for information that aims to provide open access to Indian patents and medicinal plants information. Its journals are also available online. There are also interesting gateway services that integrate access to other open-access resources on the Internet. **SciGate** at the Indian Institute of Science is a science information portal that integrates a variety of science information sources on the Web. Another example is **AeroInfo** at the National Aerospace Laboratory, which provides an aerospace virtual library.

There is an urgent need for developing an Open Access Publishing Model for India. One such proposal is a national network of distributed, interoperable, open-access digital repositories of research material, both at the institutional level and across the institutions in open-access science journals and conferences. The motivation for this network is the strong support for open-source software in India and the increasing

interest to use digital library software, such as the Greenstone Digital Library Software developed by the New Zealand Digital Library Group. This software has been used innovatively to publish content, both on the Web and on CD-ROMs There is an other emerging model provided by the E-print archives, using the Open Archives Initiative interoperability framework, which makes this software compliant with that initiative.

OA is getting importance in the country due to the following reasons :

Better outlet for local digital library development : Institutional repositories are getting increased attention in the country because of the availability of free software like DSpace and EPrints and Institutions getting convinced that archiving their in-house publications for which they have copyright is one pragmatic way to evolve internal digital libraries. Whether populated with many papers published in-house or not, many research and higher education institutions have already engaged in setting up Open Access Institutional repositories.

Largely a consumer rather than a generator of research information and thirst for research Information : India with many research and educational institutions added at regular intervals eating into meagerly increasing budget, forcing even premier institutions to drop subscriptions to core journals. The consortia based subscription enabled many institutions to at least maintain electronic access to many journals, but still access to quality journals is not available to many of our researchers. Our national output in major international databases is around 2 percent on the one hand but there is a thirst for research information. Thus it is quite natural that a host of institutions and a large number of research personnel wanting research papers published in costly journals which they can not access through subscriptions/ consortia access in their Institutions or Interlibrary Loan/Document Delivery channels to vouch for the OA route.

Role models of OA : Reputed society publishers in the country also demonstrated that OA access to their papers could be achieved without any substantial drop in their printed subscriptions. Subbiah Arunachalam points out that all 10 journals of the Indian Academy of Sciences, four journals of Indian National Science Academy with back files, Journal of the Indian Institute of Science back to its very first issue published in 1914, Indian Medlars Centre, National Informatics Centre, New Delhi with electronic versions of 22 biomedical journals, Medknow Publications, a small company based in Mumbai, with 10 medical journals are open-access journals.

There are total 22 repositories registered from India of which 12 repositories have been developed using DSpace, 8 repositories using GNU EPrints and remaining 2 using other softwares. According to content type they, are Research Cross-Institution - 3, Research Institutional or Departmental-12, e-journal/ Publication - 3, e-Theses - 2 and Other - 2. The details of these repositories as taken from the ROAR site are given in Table 8.5.

Table 8.5. Details of Indian Repositories

Sl. No.	Name	Total OAI Records	Softwares	Content type
1.	Bioinformation Bioinformation publishes original research articles in all aspects of biological knowledge discovery through mathematical and computational analysis of biological data. The journal specifically invites articles describing new biological insights based on primary or derived data. 100% freely accessible full text	–	Other softwares	e-Journal / Publication

2.	DSpace@INFLIBNET: Content: postprints, preprints, news clippings, conference articles, training materials and other scholarly publications	428	Dspace	Research Cross-Institution
3.	DSpace at University of Hyderabad, contents: archives, eprints	–	Dspace	Research Institutional or Departmental
4.	Dspace@IIA: Indian Institute of Astrophysics	1077	Dspace	Research Institutional or Departmental
5.	DSpace@nitr	283	Dspace	Research Institutional or Departmental
6.	DU Eprint Archive	111	GNU EPrints	Research Institutional or Departmental
7.	ePrints@IIMK: Indian Institute of Management Kozhikode, Scholarship Repository, 100% freely accessible fulltext	–	GNU EPrints	Research Institutional or Departmental
8.	ETD@IISc Electronic Theses and Dissertations at Indian Institute of Science, 100% freely accessible fulltext	168	DSpace	e-Theses
9.	Indian Institute of Information Technology, 100% freely accessible fulltext	–	GNU EPrints	Research Institutional or Departmental
10.	Indian Institute of Management Kozhikode, A scholarly archiving facility for the IIMK community, using the DSpace software. This service enables the Institute community to archive their preprints,	163	DSpace	Research Institutional or Departmental

	post prints and other scholarly publications			
11.	Indian Institute of Science, Bangalore, India PDF/MS-Word: 79% Research Papers: 59%, 70% freely accessible fulltext	5248	GNU EPrints	Research Institutional or Departmental
12.	ISI Library, Bangalore Publication Database	–	DSpace	Research Institutional or Departmental
13.	Librarians' Digital Library 100% freely accessible fulltext	188	DSpace	Research Cross-Institution
14.	Medknow Eprints 75% freely accessible fulltext	–	GNU EPrint	e-Journal / Publication
15.	NAL-IR NAL's Institutional Repository is the digital archive of the research output of scientists. This covers journal articles, conference papers, technical reports, presentation/lectures, preprints, Thesis, images etc. 75% freely accessible fulltext	1067	GNU EPrints	Research Institutional or Departmental
16.	National chemical Laboratory - Pune 100% freely accessible fulltext	407	DSpace	e-Theses
17.	National Institute of Oceanography, India 100% freely accessible fulltext	205	DSpace	Research Institutional or Departmental
18.	National Institute of Technology, Rourkela, India Dspace@nitr... It collects, preserves and disseminates the intellectual output	283	DSpace	Research Institutional or Departmental

	of NITR to the global audience. It archives journal articles, pre-prints and conference papers authored by NITR researchers. 100% freely accessible fulltext			
19.	OneWorld South Asia Open Archive Initiative, India. OWSA launches open archive initiative to promote sharing of development thoughts for peer review using open archiving software customised to suit the need. 100% freely accessible fulltext	89	GNU EPrints	Other
20.	OpenMED@NIC 100% freely accessible fulltext	1125	GNU EPrints	Research Cross-Institution
21.	Rajiv Gandi Center For Biotechnology, 100% freely accessible fulltext	–	Other softwares	e-Journal/ Publication
22.	Raman Research Institute Digital Repository	1353	DSpace	Other

Inspite of much development in the area of institutional respositories, one of the more interesting and difficult aspects of institutional repositories is the area of local policy development. Libraries and archives may have highly developed policies and practices around what they acquire, how it is added to the collection, who will have access to it, if and when it can be superceded or withdrawn, and so on. But when collection development becomes the basis for collaboration with faculty to acquire and manage their actively used research and teaching material, these policies become a negotiation between faculty and librarians, who both have

a vested interest in the decisions and do not always agree. For example, faculty might wish to replace an earlier version of an article with a new version, while the library wants to keep all versions available as part of the scholarly record and to satisfy citations to the earlier version. Besides, there are some others who do not want to put their achievements on the web for general use. But researchers in general would benefit, as no library can afford to subscribe to every scholarly publication and most can only afford a small fraction of them. Thus, information repositories may be one of the means for resource sharing in networked environment among the libraries.

8.12. OPEN ACCESS TO ELECTRONIC THESES AND DISSERTATIONS (ETD)

ETD is also one of the types of electronic archiving. The concept of ETD was first conceived at a meeting held at Ann Arbor. The meeting was organized by UMI in 1987. Virginia Tech (in 1997) is the first academic institution to incorporate electronic submission of theses and dissertations. West Virginia University became the second university to accept ETDs into their educational system in 1998.

Electronic Theses and Dissertations popularly known as ETDs, are the digitized version of conventional theses and dissertations. ETDs have unique features. Huge numbers of ETDs are found in Internet and Intranet atmosphere.

8.12.1. Mandating OA for ETDs

About 30 university web pages on ETD policies are seen. What is remarkable is the way they list the benefits of OA among the benefits of ETDs as if OA were a natural consequence of creating the work in digital form.

In principle, universities could require electronic submission of the dissertation without requiring deposit in the

institutional repository. They could also require deposit in the repository without requiring OA. But in practice, most universities do not draw these distinctions. Most universities that encourage or require electronic submission also encourage or require OA. What is remarkable is that for theses and dissertations, OA is not the hard step. The hard step is encouraging or requiring electronic submission.

For dissertations that are born digital and submitted in digital form, OA is pretty much the default. This is not at ail the case with journal literature. There are two lessons to draw from this. First, anything that fosters ETDs (as opposed to paper TDs) fosters OA to ETDs. Second, the call for OA to ETDs is not new. It has been part of the ETD movement since the beginning.

Notable, explicit calls for OA to ETDs have already been made by Edward Fox and Gail McMillan, Edinburgh's Theses Alive project (2004), JISC's Electronic Thesis project (2005), Richard Jones and Theo Andrew, and Arthur Sale. UNESCO's ETD project called for "equal access" to ETDs in 1999, but this is just another way of calling for OA, since priced access cannot be equal access. The international Digital Access to Research Theses (DART) project is committed to OA for ETDs but is just starting up its advocacy efforts.

8.12.2. Nine Reasons to Mandate OA For ETDs

There reasons are considered most inportant in OA initatives for ETDs.

1. Nowadays most theses and dissertations are born digital. They are already ETDs even if the university only wants to deal with printouts.
2. ETDs are Phase One, royalty-free works of research literature. Their authors lose no revenue by consenting to OA.

3. ETDs are not formally published. Hence there are no publishers in the picture to resist or oppose OA. There are no publisher fears of lost revenue to answer. There are no publisher permissions to seek. There are no publisher negotiations to delay or deter OA archiving.

4. Mandates work and exhortations do not. This is the universal lesson from OA mandates to date, whether at funding agencies or universities.

   The US National Institutes of Health (NIH) has encouraged but not required OA to NIH-funded research since May 2005. It hoped that the increased flexibility would increase participation, but it had the opposite effect. In February 2006, the NIH reported to Congress that the compliance rate by its grantees was only 3.8 per cent. The low rate led the agency's own Public Access Working Group to recommend a mandate. The Board of Regents of the National Library of Medicine reaffirmed the call for a mandate in February 2006. And in June 2006, the House Appropriations Committee instructed the NIH to adopt a mandate.

   By contrast, the Wellcome Trust has mandated OA to Wellcome-funded research since October 2005 and has enjoyed a nearly 100 per cent compliance rate.

   Australia registers all accepted dissertations, giving it a good sense of the denominator, or the number of dissertations eligible for OA. The OA repositories themselves give a good sense of the numerator, or the number that are actually OA at a given time. In April 2006, Arthur Sale summarized the results of different university policies on OA for ETDs: Voluntary ETD deposition results in repositories collecting less than 12 per cent of the available theses, whereas mandatory policies are well accepted and cause deposit rates to

rise towards 100 percent."

By 2010 onwards, UGC (India) has also made mandatory to deposit one Ph. D theis in electronic form in the universities to be hosted on INFLIBNET site as ETDS.

5. OA solves the invisibility problem for ETDs. Without OA, there is almost no access, visibility, or indexing for dissertations. They are hard to retrieve even if discovered, and they are hard to discover. When they are OA, ETDs are not only searchable by cross- archive search tools that index the ETD repositories, they are also indexed by Google, Yahoo, and Microsoft. Scirus already indexes the ETDs held by the Networked Digital Library of Theses and Dissertations (NDLTD).

   By making ETDs visible, OA helps the readers who would not otherwise have ready access. But it also helps the ETD authors, boosting their visibility and impact just as it does for the authors of journal articles.

6. Universities are in a good position to mandate OA. They can make it a simple condition of submission and acceptance.

   In fact, if universities mandate OA for ETDs, their compliance rates should be higher, and grumbling lower, than mandating OA for faculty research articles. Graduate students are not as anarchical as faculty, or at least not tenured; graduate students would not be subject to countervailing pressures from publishers, at least not as often; and graduate students more likely to see the benefits of OA and the obviousness of taking advantage of the internet to disseminate research.

   Universities that do not have institutional repositories can still mandate OA. The best way is to launch their own institutional repository. But they could use a

consortial or regional ETD repository, or they could have their students submit ETDs directly to NDLTD, which functions as a universal or fall-back OA repository for universities without their own.

7. Mandating OA for ETDs will educate the next generation of scholars about OA, when they do not already know about it. Young scholars are already more familiar with OA than older ones, at least in the sciences. But even knowledgeable young scholars may not have much experience providing OA to their own work, let alone support and reinforcement from an important research institution. An OA mandate will teach new scholars how easy it is, how beneficial it is, and how routine and expected it ought to be. It will teach them that OA is not incendiary and counter cultural, but mainstream and simply useful. It will help create lifelong habits of self-archiving.

   The greatest obstacle to routine self-archiving is unfamiliarity with the process, including groundless fears of the time it takes. Familiarity removes this obstacle.

8. An OA mandate will elicit better work. All teachers know that students work harder and do better work when they know they are writing for a real audience–large or small–beyond the teacher. The effect is amplified if they are writing for the public. Some teachers try to harness this power by telling students to write as if their work were to appear on the front page of the *News papers.* Some arrange to give students a real audience beyond the teacher. OA gives authors a real audience beyond the dissertation committee and real incentives to do original, impressive work.

9. Finally, an OA mandate shows that the university takes the dissertation seriously. The university asks for a new

> and significant work of scholarship and most students deliver one. But, as the university does not disseminate the dissertation publicly, it sends a subtle signal that it does not take it seriously as a work of scholarship. Of course the dissertation committee takes It very seriously as a work of scholarship, but the university itself does not do what it normally does when its scholars produce new and important work– it does not apply its publish-or-perish policy. This policy not only proclaims that research good enough for internal recognition is good enough for external distribution. It also proclaims the stronger converse that only research good enough for external distribution is good enough for internal recognition.

Universities have the same interests in promulgating excellent research by graduate students as they have in promulgating excellent research by faculty, the same reasons for taking pride in it, and the same reasons for applying a publish-or-perish policy or public dissemination mandate. It wants the world to know about the quality of the work done there and it wants other researchers to benefit from it. By adopting a serious public dissemination mandate for faculty and not for doctoral students, universities invite students to draw the cynical inference that the dissertation is not so much real scholarship as a hoop to jump through, a final piece of disposable "student work", an admission ticket to the profession, or a rite of passage.

Of course the dissertation is also an admission ticket and a rite of passage. Writing a dissertation is a lot like entering the wilderness alone, fasting to delirium, killing a wild animal, and then returning to civilization where one is welcomed as an adult. But universities should do more to send the signal that it is an admission ticket and rite of passage because it is a significant work of scholarship, not the other way around.

Students may regard the dissertation as fodder for some truly significant, adult scholarship they might publish in the future. But if so, the incentive to make it significant, adult, and public comes from a future employer, not from the institution that assigned, supervised, and approved the research.

Without an OA mandate, the university is saying that it does not care whether the dissertation is publicly disseminated. But if the dissertation is really a new and significant work of scholarship, then the university should care. The message should be– If we approve a dissertation, then we think it is good. If we think it is good, then we want others to be able to find it, use it, and build on it.

This message is about the purpose of universities and the value of scholarship, not about coercion. The school does not have to say "we are requiring OA for your sake" or even "we are requiring OA for our sake". It is saying, "We will do all we can to help you do good work, and then we will do all we can to make your good work available to others." It is about the mission of a research university.

8.12.3 Mandates, Coercion and Consent

The experience in advocating and implementing OA comes largely from the world of faculty, not the world of students. In the world of faculty, the best rationale for an OA mandate is to get the attention of authors. Authors control the rate of OA growth, but they are not paying attention to OA. We can not appeal to them as a bloc because they do not act as a bloc. It is not hard to persuade them, or even excite them, once we catch their attention, but it is very hard to catch their attention because they are so anarchical, overworked, and preoccupied. So we have to work through the institutions that have the greatest influence on authors.

These arguments apply even more easily to students

than to faculty– the benefits are just as valuable and the barriers much lower.

One objection is that a mandate paternalistically coerces students for their own good. If true, this would be a serious problem, though perhaps not for everyone who defends mandates. Can not be paternalism over competent adults, and certainly students are put in that category. Fortunately, the paternalism objection misses the target and is easily answered.

First, support mandates that are conditions on voluntary contracts. They might be funding contracts– if you take our money, you will have to provide OA to your research; if this bothers you, then do not take our money. They might be employment contracts– if you work here, you will have to provide OA to your research; if this bothers you, then do not work here. An OA mandate for ETDs would belong to the same family. If you attend this university, you will have to provide OA to your dissertation; if this bothers you, then do not attend this university. Students who see this as a threat will go somewhere else; students who see it is a promise are getting the idea.

Second, support mandates with reasonable exceptions. The students who have good reasons to be exempt from the mandate should be exempted, not coerced.

Third, an OA mandate for ETDs advances the university's interest, not just the student's. The student interest is greater visibility and impact. The university interest is that an OA mandate will elicit better work, better show students that the university is taking the dissertation seriously as scholarship, better fulfill the university mission to share the knowledge it produces, and better assist researchers elsewhere who could benefit from this knowledge.

In short, the paternalism objection does not apply

because the kind of OA mandate to that talking about is fundamentally consensual, not coercive, and aims at benefits far beyond the student-authors themselves. An OA mandate for ETDs is no more problematic than other academic requirements and considerably more mission-critical. Today universities seem more interested in mission-trivial details like the margins and font sizes of a dissertation than in its availability to others who could use it, apply it, or build on it.

So, ETDs are becoming popular as a new generation document. Typicall, a ETD travels through various phases from its generation to access. A life cycle of ETDs from creation to access has been shown in the following Fig 8.3.

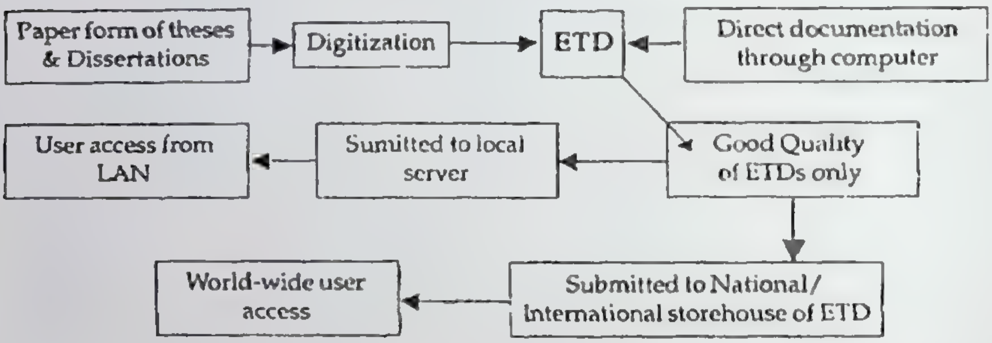


Fig. 8.3. ETD Life Cycle

Keeping its importance in digital environment, several initiatives for digital theses and dissertations have been started in foreign countries like USA, UK, China, Canada. An ETD initiative is still at its infancy in India.

Network Digital Library of Theses and Dissertations : Network Digital Library of Theses and Dissertations (NDLTD) is a non-profit organization trying to develop accessible digital libraries of theses and dissertations. The activities of NDLTD are operated by Virginia Tech. The universities having farm desire to use ETDs should join hands with NDLTD. Joining to NDLTD is absolutely free but requires some agreements. A person of any institution who may or may not be the member of NDLTD, can submit his/her e-theses to NDLTD. According

the web site http://www.ndltd.org, there are 30 Effective members and 144 Associated members. Indian Institute of Technology (IIT) Bombay and IiT Kharagpur, University of Hyderabad and Digital Dissertation Foundation are the members of NDLTD from India.

University Microfilms International : University Microfilms International (UMI) is an US-based organization, having a huge resource over 1.6 million of theses and dissertations. UMI permits both electronic and paper submission. One can order for his/her desired document from UMI either through a vender or using shopping card.

Other Initiatives : Besides NDLTD and UMI initiatives, a few other have been listed below in Table 8.6.

Table 8.6. World-wide ETD Initiatives

Sl. No	Title/Project name
1.	Australian Digital Theses Project (http://.idt.aiul.edu.au/)
2.	California Institute of Technology (http://library.caltech.edu/etd)
3.	Canadian Theses Project (http://www.nlc.ca)
4.	Germany: Die Deutsche Bibliothek (The National Library of Germany http://vvww.dissonline.de)
5	University of Waterloo Electronic Thesis Project (http://www.lib.uwnterloo.ca/ETD/ Report_l.pdf)
6	West Virginia University guide to the preparation of master's theses and doctoral dissertations (http://www.libraries.wvu.edu/index.htm)

Domestic Initiatives : Some initiatives have already been started in India. Some of them are as follows:

Vidyanidhi Project, undertaken by the Department of Library and Information Science of the University of Mysore, is trying to develop a national repository of e-theses. The project is funded by NISSAT, DSIR and by Government of India.

IIT Kharagpur, has also made compulsory that one must have to submit his/her thesis in hard copy along with electronic version. Initiative has also been taken to digitize the old theses. Students of IIT Bombay are enjoying opportunity for online submission of ETD since January 1999. An ETD web server has also been set up in the Central Library of IIT, Bombay. IIT, Delhi is also undertaken programme for online submission of theses and dissertations. Indian Institute of Science, Bangalore has also started developing a repository of theses and dissertations. There are only 124 ETDs at the present moment. Digital Dissertation Foundation, India has started adopting technology for making digital dissertations. The Information and Library Network (INFLIBNET) and Developing Library Network (DELNET) have hosted PhD databases of bibliographic records submitted to various Indian universities.

Thus, library services can be made more exciting with the introduction of ETDs. ETDs are available in various digital libraries. There are a good number of ETD submission web sites. Theses and dissertations nowadays are generally created on a computer. Hence, it is very easy to submit ETDs in digital formats. ETDs are consulted by faculty staffs, research scholars and graduate students. It is noteworthy to mention that the University Grants Commission (UGC) India has provided basic guidelines in "UGC (submission of metadata and full text of Doctoral Theses in Electronic Format) Regulations, 2005" with a view to set up a comprehensive database of doctoral theses within the country. Further with the introduction of new Ph.D. rules of University Grants Commission - 2010, it has been made essential to submit one soft copy of the thesis by every university to INFLIBNET, Ahemdabad for creating a digital library of Electronic Thesis and Dissertation, which will act as a National Depository in this direction. So it is hoped ETDs in coming years will be given more importance and weightage.

8.13. SELF-ARCHIVING

Self archiving, by the way, has the added benefit of enabling institutions to keep track of the publication output of their faculty and students. There may be many countries in which none of their open access journals charge author-side fees. Researchers and scholars need tools and assistance in order to deposit their referred journal articles in open electronic archives, a practice commonly called self-archiving.

'Self-archiving' is a broader term often applied to the electronic posting, without publisher mediation, of author supplied research. The practice of self-archiving has its roots in the field of computer sciences, where researchers were depositing results in ftp archives some decades ago and, later, on websites. A preprint culture - that is, the distribution of drafts of research articles before they have been peer reviewed to colleagues around the world, to establish ownership of the piece of research, to move the subject along, and to invite critical commentary before final revision and submission of the articles to learned journals - had been in place for many years in print form in the computer science community, and as the digital age arrived the practice simply migrated from paper to electronic form. Today, there are more articles - preprint and post-print (peer-reviewed papers) - freely available through self-archiving in computer science than in any other subject. The computer science 'online library', Citeseer (*www.citeseer.ist.psu.edu*), currently has a lot of articles that have been harvested from distributed sites around the world (websites, ftp archives), where authors have deposited their work.

Another effort was made by Paul Ginsparg, a physicist at Los Alamos National Laboratories in the US in 1991, who brought up the ground breaking online accessible archive concept of putting the preprints of scholarly articles in physics. The service, named 'arXiv', allowed authors to self-archive

their papers from anywhere in the world, grew from strength to strength and eventually it paved way for a new branch of service, namely the 'Open Access Archives'.

But the term Self Archiving in reality was first used in the literature in 1999 by leading advocates of the practice like Stevan Harnad and Paul Ginsparg. Though, it was used somewhere a year earlier in e-mail discussion lists. It seems they were knowingly or unknowingly, adapting a term already in use amongst computer scientists meaning a program that archives files automatically. Ginsparg and Harnad were now applying the term to authors and their research papers. Now a days, the term *Self Archiving* is very much used in online concern of information.

Self-archiving is the process by which researchers deposit their own work into a repository such as e-space. Repositories such as e-space do not 'publish' academic work in the same way as an academic journal. Instead, putting work into a repository complements current modes of scholarly communication and does not preclude the author from submitting research to a published journal. It is an alternative means to providing open access - by authors archiving copies of their articles in open access archives or repositories. So, self archives are the open access repositories of digital collections of research articles placed there by their authors.

Self archiving may be **multidisciplinary** like the open access repositories and located in universities or other research-based institutions, or they may be centralized and **subject-based**, such as the one covering certain areas of physics and related disciplines, called arXiv. Whatever the case may be, the institutional library can help researchers to do self-archiving and can maintain the institution's own e-print archives as an outgoing refereed collection for external use, in place of the old incoming collection via subscription

costs for internal use. Institutional library consortial power can also be used to provide leveraged support for journal publishers who commit themselves to a timetable of downsizing on the way to becoming pure quality-control service providers.

But we should not forget that self-archiving is *not* an alternative to publishing in learned journals, but an adjunct, a complementary activity where an author publishes his or her article in whatever journal she/he chooses and then simply self-archives a copy.

8.13.1. Benefits of Self Archiving

There are three ways a researcher can provide open access to articles by self-archiving. She/he can deposit a copy of an article on a personal or institutional website, or place it in an institutional open access archive, or put it in a subject based, centralized, open access archive – such as the physics archive, called arXiv, or Cogprints, the cognitive science archive. Articles may be in preprint (prepeer review or pre-refereeing) or postprint (after peer review or refereed) form. The library fraternity's contribution to the Open Access movement is commendable with the Association of Research Libraries (ARL) forming the Scholarly Publishing and Academic Publishing Coalition (SPARC) in 1997 towards curbing the impending scholarly journal crisis and to look for alternatives such as the open access.

Harnad, Ginsparg and other proponents of self-archiving are arguing that authors of research papers should mount their work on the web so that all potential readers have free and unrestricted access to it. Such 'open access' to research literature would ensure that it is "freed" from the "unwelcome impediment" caused by "toll-gating access" in the form of conventional subscriptions, site licences and pay-per-view charges. But some practitioners are against to the

'archiving' part of 'self-archiving' being used in this way to mean simply mounting a file on the web - the word implies to many a high degree of curation and preservation which may not be present in the self-archiving scenarios discussed by Harnad. Nevertheless, the label has now been widely adopted within the information community and beyond.

Self-archiving can benefit academic researchers and others by enabling quick and easy access to the research literature and therefore maximizing the impact potential of papers. Realizing that the possible benefits are high and the technical entry barriers low, many organizations such as universities have recently tried to encourage widespread self-archiving by setting up institutional repositories. Additional benefits to self archiving include the assurance of the long term preservation of their articles and the facility to have a proper control as well as meticulous monitoring of one's own publications.

Institution-based self-archiving benefits research institutions in three ways. First, it maximizes the visibility and impact of their own refereed research output. Second, by symmetry, it maximizes their researchers' access to the full refereed research output of all other institutions. Third, institutions themselves can hasten the transition to self-archiving and so more quickly reduce their library's annual serials expenditures to some extent paid to journal publishers for refereeing their submissions.

8.13.2. Barriers to Self-Archiving

There are various barriers to self-archiving remain-most of them cultural and managerial. But the major concerns are about quality control, intellectual property rights, disturbing the publishing status quo, and workload.

Lack of Awareness : Even where researchers are aware of repositories, there is still considerable inertia when

it comes to self-archiving. A study made by Swan and Brown report on the results of a survey of authors sponsored by JISC and the Open Society Institute also supports the fact. In this study, their respondents were divided into two groups: "Open Access authors" (that is those who have published in open-access journals) and "Non- Open Access authors" (those who have not). They report that 71 percent of Open Access authors and 77 percent of Non-Open Access authors were not aware of any electronic repositories. This is a significant finding for supporters of self-archiving which indicates that there is a major awareness-raising job to do. However, there is a great potential for research impact in Open Access environment as they provide much better access of information to its users.

Quality : An enduring perception about Open Access journals is that they are less rigorous, lack stringent peer review, and that the whole notion of author payments presents a conflict of interests that undermines the integrity of selection. Same is the case with the 'quality' of self-archived articles, there is a common suspicion that self-archiving undermines peer review. Because e-print repositories distribute content independently of any formal peer-review process they are often seen as a way of self-publishing without quality checks. There is a particular dislike of pre-prints in some disciplines. Of course, pre-prints are not a necessary part of an e-print repository. It is perfectly possible to set up a repository and only accept postprints. Repositories are in themselves neutral with, regard to quality control and so they can accommodate any form of quality assessment including peer review.

The scenario advocated by most of the supporters of self-archiving - authors should submit their papers to peer-reviewed journals and also self-archive them – certainly takes into account the importance of peer review. Peer review is acknowledged to be important but it is recognized that at

present it is carried out outside the e-print repository environment. In this case, repository managers should carry out low-level checks on quality before making a paper live on the system, but they can assume that the real quality checks occur elsewhere.

But self-archiving needs not be the anarchic activity as it is sometimes assumed to be, although some commentators would regard the supposed anarchy of self-archiving as a good thing. It is possible that schools or departments within the institution could have to give formal authorization before a paper is made live on the institutional server. Most repository software already has an authorization procedure built into the workflow. This could be implemented with a light or heavy touch depending on the preferences of stakeholders. Though, this is not going to replace peer review but rather that it could provide an additional first-line quality check which could screen-out obviously inappropriate material.

Author Charges : Authors may wish to support the principles of Open Access and be attracted by such benefits as faster publication speed and wider visibility, but, without financial support would be inclined to submit articles without charge to subscription journals. Scholars now have to make ideological and economic choices about where to place their articles. On the other hand, a decision by funding institutions to support author fees would speed the transition to Open Access. Furthermore, if these bodies were to mandate Open Access publishing channels (Journals or open archives) as a precondition of research funding, this would institutionalize Open Access and author charges as a practice.

Intellectual Property Rights : Some authors have another concern in the area of intellectual property rights or IPR. They are concerned that their work is more likely to be plagiarized if they self-archive it on an open-access server. Some journal publishers require authors to signover exclusive

rights before their papers are published. Other publishers do not require exclusive rights to be transferred by the author and may even explicitly allow the posting of pre- or post-prints on the web.

There is, however, no empirical evidence to support this fear, although some publishers claim that they ask authors to sign over copyright in order to enable them to protect authors from plagiarism. It may be true that making material available online makes cut-and-paste plagiarism easier but this applies to all electronic information not just that which is openly accessible. What can be said in favour of open access is that it makes detection of plagiarism easier. Many automatic plagiarism detection services can operate better when they can move around documents without barriers.

Copyright is another area, where authors have often cited this issue as a major stumbling block to self-archiving. They are anxious that, having signed over copyright to the publisher of the journal in which their article appears they will be contravening the agreement if they self-archive the article. To be sure, if they self-archive the publisher's own file without permission, then this would in almost all cases be in contravention of copyright, if that resides with the publisher. However in the vast majority of cases (www.sherpa.ac.uk/romeo.php and romeo.eprints.org/stats.php), the publisher expressly permits an author to self-archive their own final draft– the version that was finally submitted to the publisher after peer-review revisions and recommendations have been incorporated.

Authors need assistance at a local level in order to deal with the complexities of IPR and the copyright. Most institutions have research support offices which could expand to provide this sort of support. They could help to change the existing system where many authors are willing to sign more-or-less anything put in front of them by publishers in order to

get their paper published. Authors would then be supported in ways that would allow them to maximize the potential impact of their work without unnecessary restrictions.

Cost : Cost to institutions which are adopting self archiving and its maintenance to the institutions is the other area of concerns, however this is much more in the area of responsibility of librarians and institutional administrators rather than of authors. How much cost will be for setting up and running a self archiving campaign in a research-based university? How will it be paid for, whose budget will it fall under, can it be afforded, will it need an open cheque for the future? These all are related to cost issue for self archiving.

Inspite of above drawbacks, self-archiving is growing as a way of supplementing non-OA journal access with an OA version for those would-be users whose institutions cannot afford the non-OA journal. These repositories expose the metadata of each article-the title, authors, and other bibliographic details, in a format compliant with the Open Archives Initiative Protocol for Metadata Harvesting. One may use Google, Google Scholar or other Web search engines to access the contents of these archives. These search engines systematically harvest the contents of the archives worldwide, forming a database of current global research. Copyright restrictions are not the obstacle to self-archiving - preprints can be self-archived without any restriction at the time the paper is submitted to a journal. When the final draft is accepted, authors can ask the journal to retain their right to give away that draft online by self-archiving it. In practice, many publishers may agree to this if the author asks, although most do not publicly state it as policy. For these papers, the author can self-archive the refereed postprint alongside the pre-refereeing preprint(s). For those publishers who insist that all rights are transferred, authors can sign the agreement and self-archive a linked 'corrigenda' file, listing for the user what

changes have to be made in the preprint to make it equivalent to the postprint.

8.14. PROBLEMS AND SOLUTIONS OF OA REPOSITORIES

Some of the problems with their solution are discussed below.

Consumers than Generators want OA Repositories : Though there are credible studies about OA giving enhanced visibility and impact of research, researchers are still happy with the conventional route of getting their research published in print journals making such research inaccessible to those who do not have copies of the journal issue. Though a researcher in his/ her quest for a particular paper may wish to have a copy in an OA repository, such a wish may not sustain as a practice to archive one's own papers.

Fine Prints in Copyright Form : Though publishers have become soft on exclusive rights of articles due to the changing times, they still need their dominance on content published by them. When authors are required to sign lengthy copyright transfer/assignment forms as a prelude to publication, they get a bit cautious about exploring alternate delivery channels. What is required is to arrive at a general framework irrespective of publishers through which the author/institution/ subject specific repository can archive all publications of concern.

Lack of Formal Channels : Though Institutions have websites there is no policy to archive publications on such sites due to infrastructure or personnel constraints. Also creating OA needs other technical and manpower resources which are not at the reach of many Institutions. Identifying library of the Institution to collect and archive all in-house publications though an OA compliant repository would help to focus and streamline the course of open access archiving in the country.

Discussion Forums and Technical Help : Free software needs more effort to sustain them in individual institutions. You can always fall back upon the software vendor in case of problems with the working of purchased software and we can not get such a luxury in the case of the e-repository software like DSpace or Eprints. Institutions have to either develop internal expertize or seek the same from volunteers to sustain and stabilize then working in individual sites. There has been a recent spurt of training programme on repository developing software in the country and such programmes can be deemed as great success only if they end up in repository development in Institutions of the participants.

But beginning is as important as continuing. However the less number of items in the repositories indicates that those who started the repository with much fanfare have difficulties in uploading all their contents due to different reasons. Therefore institutional policies, support, staff, training programmes, user awareness are all required for sustaining a repository.

8.15. ROLE OF LIBRARY PROFESSIONAL

Now question arise what we, library professional can do to mark a progress in this direction. The first thing we need to do to create awareness amongst the research community on benefits of open access, open archive and self Archining as they are the producer and as well as consumer of information. Actions, the librarian can take to promote open access are:

1. They can Launch an open-access, OAI-compliant institutional eprint archive, for both texts and data. The main reason for universities to have them is to enhance the visibility, retrievability, and impact of the research output of the university. It will raise the profile of the work, the faculty, and the institution itself. A more

specific reason is that a growing number of journals allow authors to deposit their postprints in institutional but not disciplinary repositories. Even though this is an almost arbitrary distinction, institutions without repositories will leave some of their faculty stranded with no way to provide OA to their work.

2. They can help faculty deposit their research articles in the institutional archive. Many faculty are more than willing, just too busy. Some suffer from technology phobias. Some might need education about the benefits.
3. They can consider for publishing an open-access journal.
4. They can consider rejecting the big deal, or cancelling journals that cannot justify their high prices, and issue a public statement explaining why.
5. They can help OA journals launched at the university become known to other libraries, indexing services, potential funders, potential authors, and potential readers.
6. They can include OA journals in the library catalogue.
7. They can offer to assure the long-term preservation of some specific body of OA content.
8. They can undertake digitization, access, and preservation projects not only for faculty, but for local groups, e.g. non-profits, community organizations, museums, galleries, libraries. Show the benefits of OA to the non-academic community surrounding the university, especially the non-profit community.
9. They can negotiate with vendors of priced electronic content – journals and databases, for full access by walk-in patrons.

10. Annotate OA articles and books with their metadata.
11. They can help design impact measurements (like e.g. citation correlator) that take advantage of the many new kinds of usage data available for OA sources.
12. They can Join SPARC, a consortium of academic libraries actively promoting OA.
13. They can Join the Alliance for Taxpayer Access, a coalition of U.S.-based non-profit organizations working for OA to publicly-funded research.

It this way, the librarians and information specialists can help to popularize open access initiatives and to show them among scientific community.

8.16. WHAT NEEDS TO BE DONE IN INDIA?

Indian scientists, the rank and file as well as those who hold high positions, should take a principled stand on OA. After all OA to scientific literature benefits them the most. A few months ago, twenty-six Nobel laureates in the US signed a letter sent to every member of the US Congress urging them to support a bill that would mandate OA to government-funded research. About a year ago, when the Royal Society issued a statement on OA, obviously without consulting the Fellowship, more than 45 Fellows of the Society wrote to the President of the Society expressing their displeasure and asserting their support to OA. Not one of them was from India. Till today, not many leaders of Indian science have come out in the open in support of OA.

The major science academies, viz., the INSA and the IASc, both of which have made the journals they publish OA journals, should proactively promote OA in the country.

1. The two Academies should recommend to the Ministry of Science and Technology (MoST), DAE, DRDO, ISRO, ICAR and ICMR to come up with an OA policy

and a plan of action for implementing the policy. Fortunately for these Academies almost all the Secretaries in the MoST and heads of other science related departments are Fellows of either INSA or IASc or both. The Academies should recommend that MoST [and its different agencies such as Department of Science & Technology (DST), Department of Scientific & Industrial Research (DSIR), Department of Biotechnology (DBT), Department of Earth Sciences] and other science related departments mandate OA for all research publications resulting from work performed in their own laboratories and extramural projects funded by them. Ideally, each individual institution, where research is performed, should also have an OA mandate The National Institute of Technology, Rourkela, is the only Indian institution to have a mandate for OA. While the scientists should enjoy the freedom to choose the journals for publishing their work, they should be encouraged to publish in OA journals, and if they choose to publish in toll-access journals they must be required to place the full text of the papers in an interoperable OA repository, preferably in the researcher's own institutions.

2. The Academies should also recommend the gathering of impact metrics (downloads, citations, co-citations, chronometrics, semiometrics) via tools like Citebase and weblogs, so that the enhanced impact of OA research-can be measured. There is growing evidence for the OA impact, as can been seen from: http// opcit.eprints.org/oacitation-biblio.html. For the many journals self-archiving policies, you may see http:// romeo.eprints.org, and for institution/funder mandates, http:// www.eprints.org/signup/fullist.php.

3. The Academies and the funding agencies should

persuade research laboratories and universities (and other institutions of higher learning) to set up their own interoperable institutional OA repositories (similar to the one at the Indian Institute of Science), and persuade the heads of these institutions to ensure that the full text of every research publication from their institutions is placed in these repositories. Funding for research should depend on the applicant's past papers being available through OA channels. Evaluation of individuals could be based on only papers that are available through OA channels.

4. The Academies should recommend to the government to enact legislation, in the lines of the Right to Information Act, that would mandate OA to all publicly funded research.

5. DST, DSIR, and DBT should launch a massive training programme, in partnership with the National Centre for Science Information at the Indian Institute of Science, Documentation Research and Training Centre (DRTC) of the Indian Statistical Institute, and the NIC, to help nominees from different institutions learn to set up OA institutional archives. CSIR, ICAR and ICMR can hold such training programmes for their many laboratories,

6. Eminent Indian scientists and leaders of science should advise Indian researchers to make their work freely available either through publishing their work in OA journals or through placing all their papers in OA repositories.

7. Indian researchers should be advised not to surrender copyright to journal publishers. It is an irony that the copyright to the results of research performed by Indian researchers with Indian taxpayers' money is being gifted to journal publishers abroad without batting an eyelid. Indian researchers should be made aware of the

different addenda to copyright agreements prepared by Creative Commons, Science Commons, etc. Under the US laws, research performed in government laboratories is non-copyrightable. The Government of India should consider enacting such a law in India.

Indian science policy is notorious for delayed action and response. But better late than never. About five or six years ago, the subject of OA was discussed at the annual get together of heads of Bio informatics Centres held at the University of Poona and it was decided that DBT would support setting up institutional OA archives in all the institutions hosting Bio informatics centres. Again two years ago the topic was discussed at the annual get together held at Kasaragod. Till this day no action has been taken. More than five years ago a brief note in *Current Science* pointed out, with ample evidence, that China, South Korea and to some extent Brazil were racing ahead in science – as seen from the world share of research papers indexed in *Science Citation Index, MathSciNet, Chemical Abstracts, PubMed,* etc. It attracted the attention of leaders of Indian science, but sadly, it did not lead to any worthwhile action. Much later the Scientific Advisory Council to the Prime Minister (SAC-PM) woke up to the fact that India was lagging behind China and made a plea for increasing funds for research. The media gave wide coverage to the SAC's statements and requests. One hopes, history does not repeat and that India adopts and reaps the benefit of OA well ahead of China.

Concluding, OA is not about publishers and profit or about libraries and budgets. OA is about increasing access to knowledge, especially current advances, for scientists and scholars, teachers and students. OA is about making the field level playing for scientists and scholars who cannot afford to pay for accessing information relevant to their research. It is about increasing the rate at which new knowledge can be created and applied to the benefit of humanity. It is about

facilitating exchange of research publications and data and enabling collaboration with others located in distant places. It is about saving the world from poverty and terrorism. So, to bridge the gap of digital divide and enjoy the benefit of scientific and scholarly literature on the Internet free of cost, Open Access Initiatives could be started at every level of our academic system on a large-scale. In the present century of information and communication technology, our scholars, researchers, academicians should not lag behind because of their inability to access the scientific literature behind price barriers. Therefore, a national level mechanism is essential to promote and coordinate open access publishing and to improve awareness about these resources.

9

Information Access in Digital Libraries

The users in a digital library environment need not only to have adequate information literacy skills, but also some ICT skills to help them make optimum use of the digital environment. There are seven information skills that are considered necessary in a digital library environment:

- the ability to recognize a need for information.
- the ability to distinguish ways in which the information need may be addressed.
- the ability to construct appropriate information strategies.
- the ability to locate and access appropriate information.
- the ability to compare and evaluate information obtained from various sources.
- the ability to organize, communicate and apply information in problem solving tasks or in decision making.
- the ability to synthesize and build upon existing information, and to contribute to the creation of new information.

Thus, information need is a stage where the user

senses that it may be useful to know something that they do not know at that particular point in time. Information seeking is a fundamental human process that is closely related to learning and problem solving. According to Borgman a need is a psychological construct, and it cannot be observed by a researcher, a librarian or an intelligent agent; only indicators or manifestations of needs can be observed.

The information needed by a user to accomplish a goal- to resolve a problem, to answer a specific question or to satisfy a curiosity - may be quick and brief factual data or exhaustive and detailed. Figure 1 shows a simple model of information access. Although it appears to be very basic, in essence several complex processes take place throughout. Some of these are technological and related to the information retrieval system, users interfaces, and so on. Other processes are related to the nature and characteristics of the content as well as the specific user. The process may take more or less time, and may become simple or complex depending on the nature of the users - their cognitive abilities and background, the specific nature of the information need, and so on.

Information seeking is an interactive process that depends on initiative on the part of the user, feedback from the information system, and the user's decisions about subsequent actions based on the feedback. The user's initial information need may often change on receipt of some information.

Hence, the information search process continues till the user gets the information required to satisfy the revised information need. Appropriate technology, such as a suitable information retrieval system and user interface, may facilitate the process, but is not the ultimate answer, because the process depends largely on an individual user and their information need, as well as the nature, volume and variety of the content. Users often learn during the information search

process.

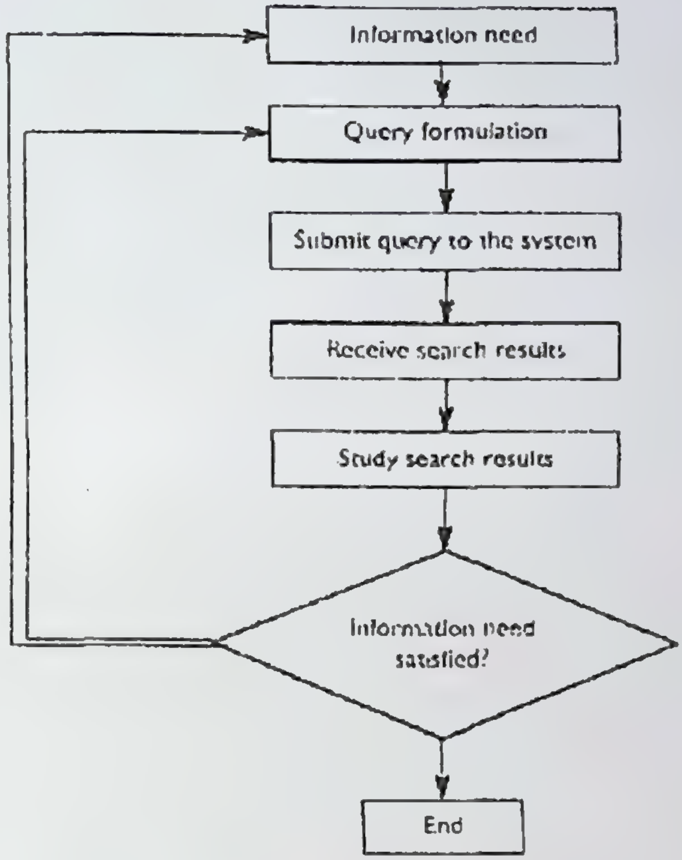


Fig. 9.1. Basic Information Access Model

For example, they may come across some information that influences their information need. The user may also acquire new knowledge about the system, and thus be able to formulate queries more skillfully and appropriately to retrieve better output. The berry-picking model of information seeking proposed by Bates suggests that as a result of reading and learning from the information retrieved through the search process, users' information needs and the queries continually shift. The berry-picking model also suggests that the user's information needs are satisfied by a series of selections and bits of information found along the entire information search process, as opposed to the output of any particular search set.

The ASK (Anomalous States of Knowledge) model proposed by Belkin suggests that an information-seeking process begins with a problem, but initially that problem and the information needed to resolve it are not clearly understood. Hence, the information seekers need to go through an iterative process to articulate a search request, and the information system should support interactive searching. The sense-making approach of Dervin posits that users go through different phases in making sense of the world. The first phase establishes the context for the information need, which she calls a situation.

People find a gap between what they understand and what they need to know in order to make sense of the current situation. These gaps are manifested by the formulation of questions. The answers to these questions are then used to move to the next situation. Marchionini comments that Dervin's model applies more to general human conditions than to information seeking, but the model has been adopted by researchers in information science and communications as a framework for studying the information-seeking process.

A model of how students search for information as part of their writing process, involves seven stages – task initiation, topic selection, pre-focus exploration, focus formulation, information collection, search closure and the starting of writing. Each layer in an information system interacts with every other design layer, and this cascade of interactions culminates in the interface, where all the prior interactions have either worked to produce effective information retrieval or to produce system elements that work at cross-purposes. Thus proposes a design model, called the Cascade Model, for operational information retrieval systems. The basic proposition of this model is that without the design of all the constituent layers of an information retrieval system being integrated, the resulting system is likely to be poor. There are four layers in this model:

– The first layer comprises the infrastructure - network, hardware, software and databases.

– The second layer comprises the information or content combined with the metadata structure.

– The third layer represents the information retrieval system - from information in searchable form to the interface design supported by the technical infrastructure, and

– The fourth layer is the human part of the system, comprising of user searching activities and user understanding and motivation.

Nicholas stresses the need for qualitative assessment of user needs. He identifies eleven major characteristics of information need – subject, level, quality, place of publication or origin, function, viewpoint, date, processing and packaging, nature, quality and speed of delivery. But the question arises that where does all this information come from? The answer is 'everywhere'–because not only can anyone access information on the net, but also publish it. In one sense, Internet can be thought as a vast and growing online library in which anyone can publish anything he wants. Files on the Internet too need an address for accessing. A file's address is formally known as its Uniform Resource Locator (URL).

Let us take an example of a URL say http://www.ala.org/events/ev_home.html. An address of a website is commonly enclosed with an arcane list of symbols beginning with the letters 'http://.' Here, 'http' stands for hypertext transfer protocol. It is the content identifier or content-id in short. The content-id tells the browser which protocol or language was used to create the current page. The browsers may support other protocols, such as ftp://, gopher://, telnet://, etc. The second part of the same address i.e., www.ala.org/events/ev_home.html identifies the location of the particular web page

or resource.

To understand the location better, it can be divided into two smaller parts the first part is the domain name or host name. Each computer connected to the Internet has a unique name that makes it easy to identify it from the thousands of other computers connected directly to the web. A PC may not have a domain name but the service provider does because it is connected to the web. So the address www.ala.org refers to the web managing portions (WWW) of a computer called ala.org. The org part tells that this computer is basically used for organization purposes. Other popular extensions include '.com', '.edu' or '.gov', etc., indicating a commercial enterprise, or educational institution, government, etc. The second part of the location is the name of a particular web resource. This name looks very much like a directory path because that's exactly what it is. Here, in our example, the address will connect the viewer to a document called ev_home.html, located in the events directory of the ala computer.

To have an Internet tour, the most important piece of software one needs is called a browser, a program that lets a user visit different sites on the net and display their offerings on the computer. Most popular browsers are Netscape Navigator and Internet Explorer. Any one may visit a site by supplying the browser with an address or URL The browser downloads the document whose URL is given on user's computer screen.

The first page appearing on any site is generally called the home page–which is the primary document of a site giving details about the site and introduces what would follow. From a particular web page one can access other related sites and information by clicking onto links which are conspicuous either by a different colour or type.

9.1. WEB PAGE

Web page is the heart of internet. It is written in programming language. Any connecting client can reach the page from a remote host. It is important to clear that the term, 'website' (often shortened to just site) is a collection of web pages (http:// en.wikipedia.org/wiki/Website). These web pages are written in HTML (hypertext markup language) and are translated by the Web browser.

Web pages can either be static or dynamic. **Static** pages show the same content each time they are viewed. **Dynamic** pages have content that can change each time they are accessed. Some pages are typically written in scripting languages such as PHP, Perl, ASP, or JSP (http://www.canadawebcenter.com/glossary htm). Web page and web sites are often considered as synonymous.

Home Page : A page on the World Wide Web (WWW) that is the first page of a website. Usually it is called, index page. When we go to a web address, this is the first page our browser looks for (http://www.myispforum.com/glossary/Homepage.html).

URL : Abbreviation of Uniform Resource Locator, the global address of documents and other resources on the World Wide Web. As stated earlier, the first part of the address indicates what protocol to use, and the second part specifies the IP address or the domain name where the resource is located (http://swhs.springbranchisd.com/ faculty/Technology/terms.htm). URL, first created by Tim Beraers-Lee for use on the World Wide Web, the currently used forms are detailed by Internet standard RFC 1738 (http://en.wikipedia.org/wiki/URL).

Domain Name : A domain name is the text name corresponding to the numeric IP address of a computer on the Internet. A domain name must be unique. Internet users

access to website using the domain name (http://www.simplenet.com.au/ sbc_glossary.shtml). Domain name is providing by commercial authorized agencies.

ISP : An ISP (Internet Service Provider) is a company that provides individuals and other company's access to the Internet and other related services such as Website building and virtual hosting. An ISP has the equipment and the telecommunication line access required to have a point-of-presence on the internet for the geographic area served (http://www.cesa8.kl2.wi.us/ media/digital_dictionary.htm). The commercial institutions provide space for web hosting and Web browsing facilities.

9.2. STATIC AND DYNAMIC PAGE

Static Page in web site terms means web pages that are not interactive. Because, the web site visitor does not have any control over the information provided, the pages and information do not change with each visit. There is not a two-way communication between the user (client) and the web site (server) in a static page (http://www.vidoni.com.au/html/glossary.html).

Dynamic web pages are pages where the content cannot be predetermined, for instance Date/Time and User Name. They often utilize programming language in their HTML code, which is read and executed by the Web server, The Web server then generates the HTML and sends it to the browser where it is displayed. The examples of common formats of Dynamic Web Pages include PHP, ASP, JSP (Java Server Page), Microsoft .net and CGI/Perl (http://en.wikipedia.org/ wikipedia.org/wiki/ Dynamic_Web_page).

9.3. WEB IN VARIOUS PLATFORMS

Web pages are hosted on web server and are accessed through web client browser.

Web Server : Computer which stores web pages in the form of directories and fields and provide these files to be read, are called 'Server'. Usually the server computers run by the web server software, that allows (a) Web sites management, (b) Accept a client's request for information, and (c) Responds to a client's request by providing the page with the required information. There are many kinds of web servers like, Internet Information Server (IIS); Apache Web Server; Netscape Server and Microsoft Personal Web Server, etc.

Web server Software stores and manage web pages. When required, the web server accepts requests for those web pages, retrieves these web pages from its HDD (Hard Disk Drive) and sends the page back to the client who requested for it.

Web Client Browser : It is a software application that is used to locate and display web pages. The two most popular browsers are Netscape Navigator and Microsoft Internet Explorer. Most modern browsers can present multimedia information, including sound and video, though they require plug-ins for some formats (http://www.oln.org/studentservices/definitions.php).

Computers that offer the facility to read information stored in web pages are called, 'web clients'. Web clients run special software called 'Browser' that allows them to: (a) Connect to an appropriate server, (b) Query the server for the information, and (c) Provides art interface to read the information returned by the server.

Web page may be used in internet, intranet or extranet. These three terms are defined in Table 9.1.

Usually, a server is a distributor and clientele are receivers. A server may serve a huge number of clientele at a time as remote login method, with the help of TCP/IP protocol.

Table 9.1. Internet, Intranet and Extranet

Sl. No.	Types of Concept	Platform
1.	Internet	The internet is simply the Net, which is publicly available in the worldwide system of interconnected computer networks that transmit data by packet switching using a standardized Internet Protocol (IP) and many other protocols.
2.	Intranet	An intranet belongs to an organization, and is designed to be accessible only by the organization's members, employees, or others with authorization. An intranet's Web site looks and act just like other web sites, but has a firewall surrounding it to fend off unauthorized users. Intranets are used to share information among the members of a specific organization. Secure intranets are much less expensive to build and manage than private, proprietary-standard networks.
3.	Extranet	Extranet refers to a group of websites, belonging to independent entities that are combined together in order to share information. This is in contrast to an intranet, which is a private site that is only accessible for employees of an entity. Extranets are used in the supply chains to allow for more effective communications along the supply chain. They are replacing proprietary standard networks that are considerably more expensive to establish, and therefore were only used by large organizations.

Web Page Designing languages are special kinds of languages depends on the necessity of the Web. Web languages are high level languages. As regard to its function, web languages can be divided into two ways such as: (i) Client Based; and (ii) Server Based language. It is important to distinguish two languages to convey the merits and demerits of the both in the following Table 9.2.

Table 9.2. Web Languages

Sl. No	Based	Languages	Merits	Demerits
1.	Client Based	HTML, XML, SGML, XHTML	a. Good & easy b. Crawler based search engines can crawl easily	a. Any one can copy the language from site b. Design may be copied by others easily
2.	Server Based	ASP.NET, Perl, PHP, Macromedia Flash, ColdFusion, Java, Java™ Server, Java Server (JSP) ColdFusion Markup , Languages (CFML)	a. Special type of languages b. No one can copy the languages from site, and c. Good for Dynamic Page for Security Aspect	a. Crawler based search engines can not crawl easily

Both Web-based and Client-based languages have different attributes to perform their job. From the above table, one may choose the language for its own needs. If the page is dynamic, then one may select server-based languages for the selected pages. Actually to help the crawler based search engines, one may prepare its own pages by client-based languages.

9.4. STEPS IN DESIGNING A WEBSITE

The process of creating a website consists of an ordered series of steps that will help to create a website successfully. These steps are needed to take manually. It is the preliminary study of web page. The pragmatic steps plan systematically as to which type of information will be included in the web according to the aims and objectives of the parent organization. While designing the web page, it is important

to arrange folders near the top of the structure, so that new resources can be added at a later date. It is important. to create a story-board of ideas that will represent the activity. It is also helpful to write each concept or activity on a different piece of paper, and then physically arrange them until fulfillment of the structure.

When naming files, one should avoid using uppercase letters in the filename. One should use short, but descriptive names for each file that will be created. To launch a web, it is important to take the permission of appropriate authority, if it has restrictions of information dissemination publicly. Without the explicit permission or consent of the authority of the parent institution, it is not desirable to launch the web page. Adequate finance is most crucial to develop and launch a web site. In order to have proper manpower domain name, ISP (Internet Service Provider) facility, web server, financial ability of the institution, to arrange all the above facilities is highly desirable. It is also important to employ appropriate manpower to exclusively look into the technical matters of the functioning of the web-page.

Complete procedure is discussed in details as under.

9.4.1. Planning for Website

Good planning is the basic step to be considered for designing of website. One should have an idea of how he wants to design the page. An outline has to be created which helps in organizing and structuring the page. It is important to know that designing a web document is different from the one for a printed document because of the fact that the printed pages in a book follow a linear progression when it is read in a particular order, while in a web document the navigator can jump, hop and navigate from one page to another. These characteristics make structuring of web sites tricky and one needs to take utmost care in making provision for jumping

from one page to another without creeping in any element of confusion and leading navigator in a state of bewilderness.

The sketch or outline is an important starting point. It forces one to grapple with matters of organization at a time when it is easy to change the structure of the web page. As one adds and deletes ideas on the page and shifts points from main to secondary topics, one thinks of satisfying the user's needs. It speeds up the review process when the page must be approved by higher authorities. It becomes much easier to make changes at this stage than later when one has invested time in the draft.

It will not help in identifying the linkages between the pages and how they are going to interact with each other. For this purpose, the web site developers draw jump maps when creating a new home page. This jump map really facilitates in linking of various pages so as to make provision for logical and meaningful navigation. A jump map can be of great help to organize the site. The jump map or site map can be explained by Fig. 9.2.

Here, responsibility, accuracy and retrieval are also important.

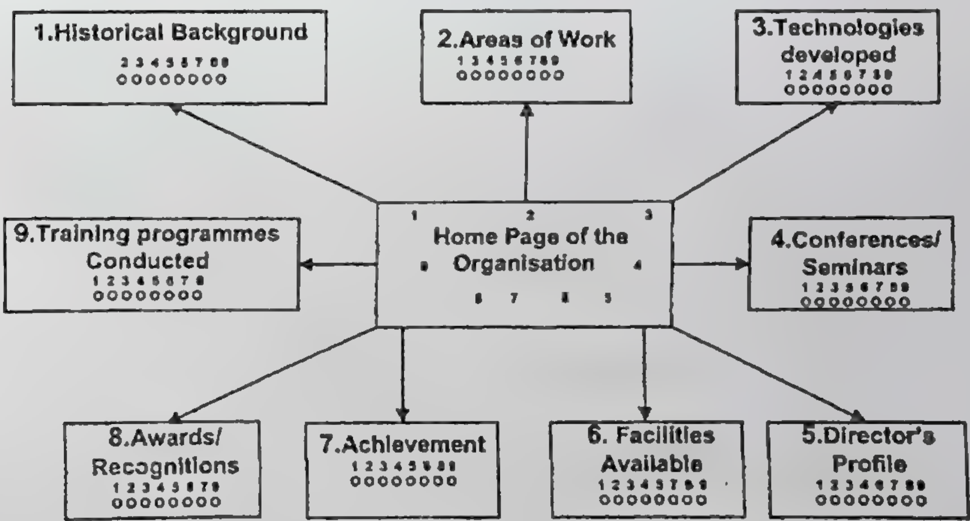


Fig. 9.2. Site Map

Responsibility

- Responsible person has to look into the contents that goes in WWW collection.
- Right decision should be taken regarding the documents which may go in public.
- Care should be taken while transferring the information. An error at this point could produce problems at the final stage/
- Electronic version should get released before the published version.

Accuracy and timeliness of the information (Editors Job)

- Ensure accuracy regarding the information for public use.
- Contents in the web page should not have a missing link.
- Text formatting should be proper.
- Spelling and syntax should be proper.
- Links should be verified.
- Consistency in the style to be followed on all the pages.

Retrieval/Navigation

- Links to be provided to all the necessary search points.
- Watchout for dead links.

Standard icons

- Standard icons should be used on all the pages.
- GIF and JPEG are generally accepted formats for graphics, portable network graphics (PNG) is also used.

- Portable Document Format (PDF).
- Images no wider than 480 pixels.

The website development and maintenance team will cross the traditional boundaries in the organization and may include members from several departments. To make a website dynamic and user-friendly, modifications and updations should be done periodically. It is possible if one has the team of professionals dedicated for this purpose. Keeping this objective in view, a website development group should be constituted which will include the following professionals:

Designer : Designing new pages or change the design of existing pages.

Content Provider/Developer : The person should be responsible for developing and providing the contents which will be uploaded on the website.

Editor : Editing new contents for the website and the contents received from the content provider.

Proof Reader : Checking up the matter put up on the site for any mistakes.

Photographer/Illustrator : To provide the pictures/illustrations of various events, happenings, etc.

Co-ordinator : Co-ordinate with various departments/divisions/organizations to keep the contents of the website updated.

Web Administrator : Take care of web and mail administration of the website.

Imaging Professional : The person should have expertize in the imaging software like Adobe PhotoShop, Flash, Image Composer, GIF animator.

HTML Professional : Person expertizing in FrontPage/ Dreamsweaver to develop static pages.

Web Programmer : For developing applications in Java, ASP, and CGI, etc. for interactive web pages.

Public Relation Officer : To interact with general users and convey to the technical team the various changes required for the better interaction between the website and the users.

Besides, planning for Website Security is also an important step though its role came later. Once a website has been uploaded to the wider world of the Internet, security issues are to be kept in mind and one must be prepared to devote a great deal of time and attention to protecting website from external intruders. Network security is the aspect of the web administrator's job that has to do with ensuring that only authorized persons use the web server to change the contents and that they do so only in the authorized ways. Security here means to make the website data available whenever the authorized users need them. External threats are the most problematic. One never knows when an outsider will attempt to breach website or who the perpetrator may be. Millions of people use the Internet everyday and many of them will try to break into website just to see if they can do so. Once the security policy has been formulated for website, it is time to look at some of the methods one can use to stop malicious intruders from gaining unauthorized access to the site. One can use the packet filtering routers or the screening routers. Firewalls are also used. The firewall sits between local database machines and the Internet. Reverse proxy servers are also used with some security features incorporated into them for a faster and more secured site access by the Internet users.

9.4.2. Designing of Web Site

The components that make up a web page are: Text, Pictures, Animated graphics, Audio files, and Video files

It is not necessary to include all components on a page. The first priority is to make sure that pages are fast to download, easy to read and well-organized. It is not essential to include animated icons to make a page visually interesting; some very nice pages have been created using 'only well-thought-out text and pictures.

HTML (Hyper text Markup Language), DHTML (Dynamic HTML), XHTML (extensible HTML), XML (extensible Markup Language), VRML (Virtual Reality Modelling Language), and SMIL (Synchronized Multimedia Integration Language) can be used for web site development.

The general steps one should follow to create a web page are:

1. Use a text editor like word pad or notepad or web page editor/authoring tools like Microsoft's Front Page, Macromedia's Dreamweaver, HoT MetaL, Hot Dog to create the pages for the site and save them as HTML files. These web editors create HTML codes for the text. For example, if one creates a file named 'abc' in word pad, he has to save the file as abc.html. The images can be saved in gif or jpg format. For editing of images any of following tools/programs can be used – Adobe Photoshop, Microsoft's Image Composer, Macromedia's Fireworks, Paint Shop Pro, etc. A clipart can be used, if graphics are not self-created. Programs like Corel Clipart, Front Page Clipart, etc. can be also used.
2. Prepare/Digitize other individual components, e.g., audio/video/graphics/animation files. Sound or video equipment are needed for creating audio or video files.

- For creating animation, Macromedia's Flash or Macromedia's Shockwave, etc. can be used.
- For including audio/video on web, the following formats can be used:
  - Audio file format *.aiff, *.aif,*.au, *.rnid, *.wav.
  - Video file format *.avi, *.mov, *.mpeg, *.mpg.
  - Streaming format: Allows media to begin playing while it's being downloaded.
- Real Audio/Video
  - Quick time,
  - Microsoft's streaming, and
  - Shockwave.
- MP3 format

3. If the page requires more advanced features, such as forms that users can fill in, or a connection to a database of information from which informational pages can be created based on user requests. A form on a web page is just like a form on paper. Visitors fill out the form to order products, give answers to a survey, or other purposes. Based on the information provided in users' forms, the web page can run CGI scripts, which are the programs that process the information filled in by the visitors.
4. Use a browser to view the page that have been created. Check that the text is spelled correctly, graphics look good and that links among the pages work. Repeat these steps until the page looks presentable enough to publish.
5. Publish the page by putting all of its files (HTML files and graphics files) on a web server.

6. Use a browser, view the web pages as stored on the web server. One should view the page by using at least two web browsers – for example, Netscape Navigator 4.5 and Internet Explorer 5, because different browsers format pages slightly differently.

7. Publicize the page, get feedback, get new ideas and repeat the steps.

Coming to the designing of a web page, one should try to organize the information on the site so that it is easy to find and is seen in reasonable context. The first thing one has to know is where people are going to start from. Most sites have a home page similar to front door in a house. Other sites are designed so that people interested in different topics come in via different pages, often from links on other pages. The simplest site has just one HTML page.

Controlled Site : If one wants visitors to see in a fixed order then a linear site is built with no optional path. For example, one can have a presentation or a story or article.

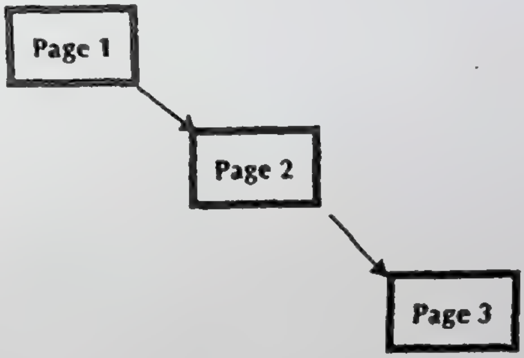


Fig. 9.3. Diagram of Controlled Site

Tree Structure : Here, the home page serves as table of contents. The links on that page take the user to a number of pages, each of which can be a content page or can have a more detailed table of contents with its own page links. Each page should have a link back to the one that it branches from, and possibly a Sink to the home page.

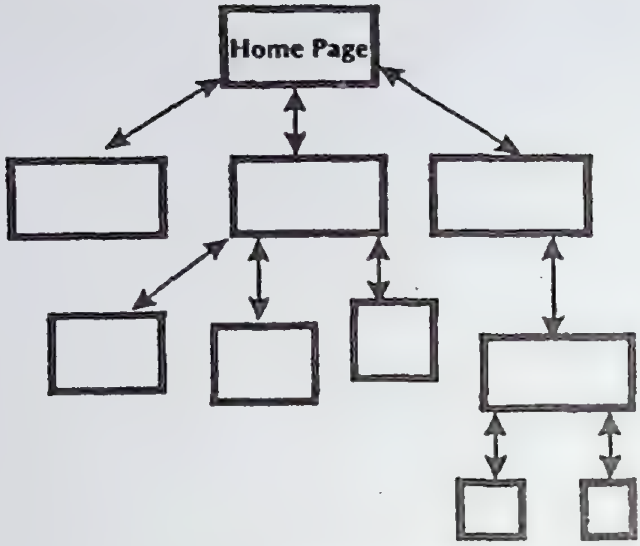


Fig. 9.4. Diagram of Tree Site

Equilateral Structure: Every page is linked to every other page in an equilateral structure, usually by a group of links at the top or bottom (or both) of the page. This type of structure enables quick movement from one page to another. It eliminates the problems regarding from which page the visitor is coming in; no matter which page that is, he will be able to access to the other pages. But, this type of arrangement has some difficulties like for a site with a large number of pages, the number of links becomes unwieldy and to add or remove a page, one has to change all the pages.

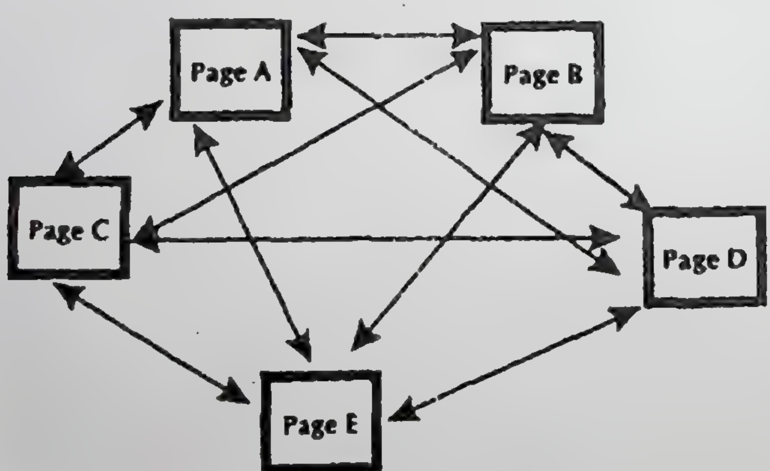


Fig. 9.5. Diagram of an Equilateral Site

Combining Structures: A site can be formed by combining the above-mentioned structures in a way that makes sense for the site. Fig. 9.6 shows an equilateral set of pages on various topics, some of which serve as the starting page for a tree structure.

Some of these pages contain links that leap to unconnected pages for ease of users. One has to make sure that basic structure must be reasonably clear to the visitor.

The following guiding principles can be kept in mind while designing a web page:

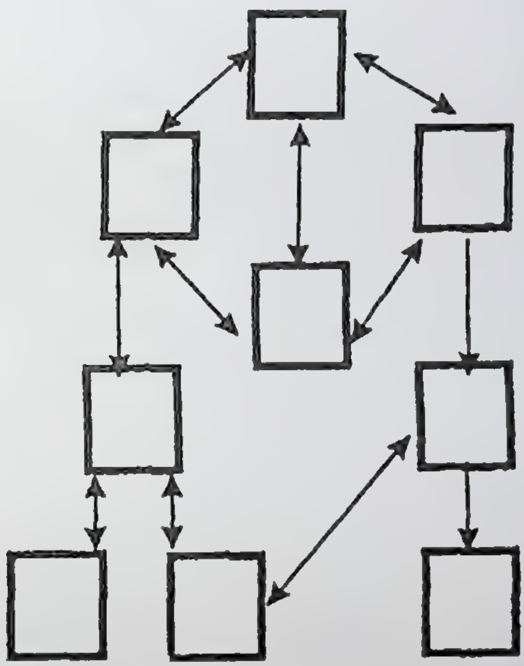


Fig. 9.6. Complex Combination of Structures

Content : The content should –

– Provide useful and valuable information.

– Consider the high cost of following each and every link and make sure each page has useful content on it.

– Create material targeted specifically at the selected audience.

– Add compelling content–something the visitor is not expecting.

Scope : It should be clearly defined. And –

– Start small. It is better to publish a few excellent pages than a large quantity of partially complete pages.

– Gradually add material to the page. Do planning for future expansion.

Links : The links should have following attentions :

– Do not create a page that only has links.

– Be sure to annotate links so that visitors have a clear idea about what's going to follow.

– Structure the material so that visitors do not have to follow too many links to get to the desired information.

– Include navigational links on every page. At least there should be a link to the home page on every other page.

Appearance Counts : Along with the useful content, it is important for the layout to be attractive. While designing, the following points should be kept in mind:

Graphics : Points to be remembered are :

– If the graphic is larger than a two inch square or a one by three inch rectangle, use a thumbnail image of the picture.

– Use thumbnails, if there are many images on a single page. Visitors can click on these images to see the full-sized versions.

– Reduce the colour palette to the lowest possible pallette size to ensure quick download of the web page.

– Use the same graphics as often as possible. An image that is used repetitively only needs to be downloaded once. Using a large number of different images will slow

the download time of a web page. It may desist the visitors visiting the web page again.

- Break big images from in to parts for simultaneous downloads
- Do not use more than one animation per page.

Background Colour or Image : Following points need attention :

- Add background colour or a background image, but do not use busy backgrounds. Even if the text shows up clearly on the background, it can be difficult for people to read if there is too much text or animation in the background.
- Light backgrounds should have dark text and dark backgrounds should have light text. Be careful in choosing the colours. Not all computers see the same colour hues.
- Make background width 1300-1600 pixels for those with larger screens.

Besides, use the font size tags to vary the body text and the header tags to vary the size of the headings and sub-headings and different colours to give good effects. Read the terms artists laid while using an image from their website. Many appreciate a link back to the website while others do not want. Citing Internet sites which have been used to gather information as resource links will lend credibility to work. It also prevents one from misusing other people's work.

At the end of each web page, one usually includes the following information:

- The name of the author of this activity.
- E-mail address of the contact person for this activity.
- When was this web page last updated and links were

checked.

– Name of the host or organization.

9.4.3. HTML and Web Publishing

The technology of web publishing has evolved fast from HTML to JAVA. HTML is a document description language derived from SGML that consists of text and fixed tags, and is the original and most widely used markup language on the web. Tags describe the attributes of the text and other content and are used by clients to determine how to display the text or perform other manipulations. In HTML, both the tag set (the choice of tags) and their semantics (what they mean) are fixed. A list of HTML tags is given in Table 9.3.

The designing of components of page in HTML include following steps :

Pagetext : Headers can be made using the commands <h1>, <h2>, <h3>, <h4>, <h5>, and <h6>. HTML has relatively little control over the fonts in which the document will be displayed, although the text can appear in bold or italics. There are other block formatting and font commands listed below.

Format Blocks : Different browsers may handle some of these tags in the same way; i.e., they may not provide as much of a distinction as one wishes. The essential block formatting elements are:

<ADDRESS> ... </ADDRESS>

Format an address section

Force a line break

<p>... </p> -

Specify what text constitutes a paragraph

<CENTER>... </CENTER>

Centers the text inside it

<PRE>... </PRE>

Use text already formatted

<BLOCKQUOTE>... </BLOCKQUOTE>

To quote text from another source

Fonts are a very important part of any web page. A page looks better if it has a good choice of font sizes and styles. It can be done as follows :

The <FONT> tag is very powerful. With its use, the size or colour of the font can be changed at any time. <FONT SIZE=(+ or - size)> will increase or decrease the size of the current font. Here's one example of making the first letter of each word in title bigger:

<H3><FONT SIZE=+2>T</FONT>IT <FONT SIZE=+2>F</FONT>OR <FONT SIZE=+2>T</ FONT>AT</ H3>

Here is what it looks like: TIT FOR TAT

The <TT> tag changes the font to Courier, if the browser settings are not altered.

Backgrounds & Colours : The simplest and effective way to make a page attractive is to add to a page a nice background. Colours are specified as a series of three hexadecimal numbers representing the share of red, green, and blue. For monitors that display fewer colours, the colours selected would be approximated. In the Hotdog editor, choose colours using sliding bars for the share of red, green, and blue; it figures out the corresponding hexadecimal values. One can also change the colour of the text and of the links, before and after they have been clicked. These commands all go in the <BODY> tag, which comes at the beginning of

the document after any header information. It can be done as shown below :

<BODY BACKGROUND="filename">

Suppose we have made logo of an organization and want to give it as background image. We will save it as gif file say logo.gif. It will do the job. It is nice to also add an ending </BODY> at the end of the file.

<BODY BGCOLOR="#RRGGBB">

Allows to set the colour of the background to something specific.

<BODY TEXT="#RRGGBB">

Sets the colour of all normal text within the document.

<BODY LINK="#RRGGBB" VLINK="#RRGGBB" AUNK="#RRGGBB">

Sets the colour of all other text in the document. LINK is just a regular, never before visited link, VLINK is a previously viewed link, and ALINK is an active link ('The colour when clicked on it'). Any or all of these three options can be omitted.

RR, GG, and BB are two-digit hex numbers (00-FF) representing the amount of red, green, and blue in a particular colour. Since it would be too difficult to have a good defined list of colour names, hex numbers are used as well, so one can invent own colours. "#FFFFFF" represents white and "#000000" black.

Creating Tables : The table must start with the command <TABLE>. Each row must start with the command <tr> (for table row) and within the row, each cell must start and end with <TD> and </TD>, respectively. It ends with the command </TABLE>. If one uses these commands, Netscape and other browsers that support tables will take care of the

rest and have a generic table. One can add a caption to the table by using the command <CAPTION>, the text you want, and then </CAPTION>. If you want a header row in the table, use the <TH> and </TH> commands for the first row.

Tables Definitions : It can be defined as shown below:

Define table

<TABLE></TABLE>

Table border (either on or off)

<TABLE BORDER></TABLE>

Table border (one can set the value)

<TABLE BORDER=?></TABLE>

Cell spacing

<TABLE CELLSPACING=?>

Desired width (in pixels)

<TABLE WIDTH=?>

Handling Images : Images are an essential part of web pages as they convey a great deal of information. They can serve as icons on which to click for moving to other places. The graphic that looks great to the designer might make visitors click stop and move to another page.

A graphic can be mixed right with the text, in that case it is called an 'in-line' graphic, or one can have a link to a graphic which will display by itself on the screen. Some browsers can only handle the latter.

The tag for in-line images has the form:

<IMG SRC="filename" ALT="Description" ALIGN=top | middle | bottom >

For a visitor who cannot view graphics, designer must write a description of the graphic in the 'ALT=' field that he or

she might view. ALIGN specifies if the following line of text is aligned with the top, middle, or bottom of the graphic.

A common and exciting way to use a graphic is to make it part of an internal or external link. Suppose we have the graphic file apple.gif in which a picture of an apple has been drawn. And we want someone to click on this file apple.gif to go to another html file called fruit.htm where the text describing information about orange is given. The syntax for this would be:

<A HREF="fruit.htm"><|MG SRC="apple.gif" ALT="An Orange"></A>

Here we start with the A or Anchor command, put in the reference, and then instead of text we put the graphic reference. Finally close the anchor command with </A>.

If a user clicks any web page and chooses 'View Source' from the browser menu, the corresponding HTML code that the user's browser is following to produce the web page will be displayed. A complete HTML document begins with <HTML> and ends with </HTML>. An example of web page tagging using HTML is shown in Fig. 9.7.

Java is a programming language which can be used to create small miniprograms called applets that can be embedded in web pages. Java applets can be played on any type of computer–Windows, Mac, or UNIX.

Applets are small single-purpose applications that cannot run by themselves; one has to use a compatible web browser (such as Netscape Navigator, or Internet Explorer) for them to work.

9.4.4. Frontpage 2000

FrontPage 2000 is a popular web editing tool, developed by Microsoft for creating, publishing and managing world wide web pages. The main features of the program are:

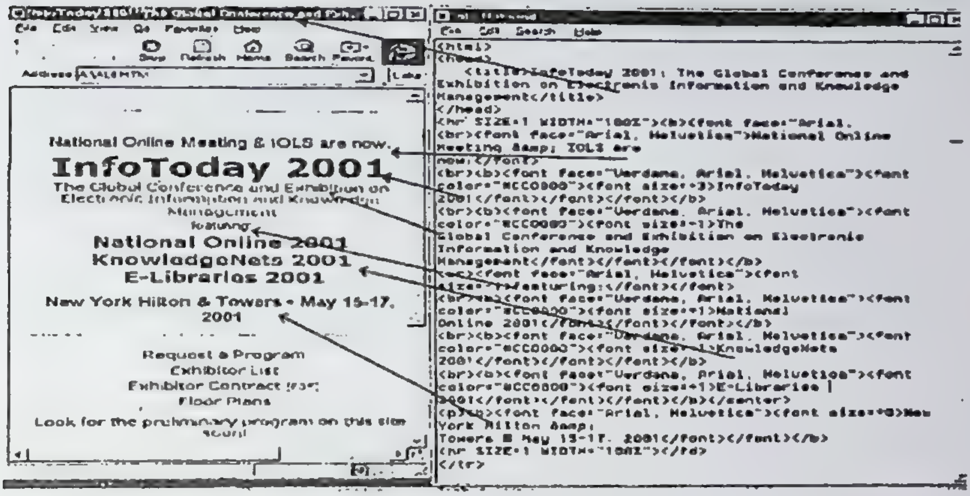


Fig. 9.7. Corresponding HTML Tags of the Web Page shown in Left Pane

- Creating new web page quickly with templates, themes and wizards,
- Web Clip Art–to include cliparts,
- Add Drop Down Menus–they enable the user to choose from several possible options,
- Bringing existing sites into FrontPage 2000 without losing any of their HTML coding,
- Editing web pages exactly as they appear in a browser,
- Switching between normal editing and HTML coding,
- Verification of links,
- Turning features of FrontPage 2000 on and off depending on web browser used by page visitors,
- Using FrontPage server extensions to add interactive capabilities like surveys, discussions forums and feedback pages,
- Supports inclusion of forms and frames,
- Connecting the site to Microsoft Access database or Microsoft Excel spreadsheets,

- Integrating web with the other programs in Office 2000 suite,
- Editing, cropping and adding transparencies to images within FrontPage instead of using an image-editing program, and
- It implements sophisticated web technology like CSS (Cascading Style Sheets), Javascripts, and ASP (Active Server Pages).

The components of FrontPage 2000 include :

- FrontPage Explorer–tool to create, view and maintain the web,
- FrontPage Editor-HTML Editor, and
- Image Composer–Graphics editing tool.

9.4.5. Maintaining Web Page

Once an activity is created, one needs to constantly check and revise data to keep it current and informative. A web page will wither away if host does not revisit it often to improve its appearance, content, and organization, or to add up-to-date information to it. To avoid chaos, one needs to establish a clear, simple system for making updates. Every site needs a Webmaster to fix things that go wrong, respond to basic e-mail, keep the server running, and post updates and changes to the site as they evolve. One must remove outdated material and broken hyperlink, etc. In short, setting up a web page is not likely to be a one time project one can just finish and forget, it is more of an ongoing commitment.

9.4.6. Publishing Tools

Web editors are good for the laborious task of creating web documents, but they do not necessarily help out much with the ultimate project of building a coherent site out of its

constituent pages. They might check the links as they exist now, on the computer, but it takes a special program to help remotely control a site on the server. Such programs can update changed pages regularly and move pages around without manually retyping all the links to those pages.

These programs are more than web editors. Since they help out with the site management they are called web publishing programs.

Adobe PageMill : It publishes our locally created pages to the public site. It finds bad links and corrects links when we re-arrange pages.

Microsoft FrontPage : It is like a basic web editor but has sophisticated site management and automatic/dynamic content creation.

NetObjects Fusion : It allows to design pages in its own format which it eventually translates to HTML when all the pieces are put together.

Netscape Composer: It has complete integration with the Netscape package, one can browse to a page, notice an error, click the edit button, correct the error, click the publish button and post the page back to the server, after error correction.

Table 9.3. HTML Tag List

Attributes	Description
<!–text–>	Comment (text is ignored)
<!DOCTYPE>	Header information about file format
HTML	Indicates an HTML file
PUBLIC	Indicates a readable document
"Standard"	Indicates the HTML standard in use
</tag>	Ends the effect of the indicated tag

<A HREF="*URL*">	Marks the start of a link to a document
METHODS= "method,.."	(Advanced) Lists functions document supports
REL= " *value, ...*"	(Advanced) Lists relationship of link
REV="*value*, ..."	(Advanced) Reverses relationship of link
TITLE= *"text"*	Gives a name for the page linked to
URN=*"URN"*	(Advanced) Resource name of document
<A NAME=name>	Names a location, for use as a target
<ADDRESS>	Text format for mailing addresses
<APPLET>	Loads a Java applet
ALIGN=*alignment*	Locates applet display within text
ALT= *"text"*	Text for display by non-Java browsers
CODE=*"URL "*	(Required) Indicates the program file
CODEBASE= *"URL"*	Directory the program files are in
HEIGHT=*pixels*	(Required) Applet display area
HSPACE=*pixels*	Horizontal space from applet to text
NAME= "*name*"	Names applet for intertask messages
VSPACE=*pixels*	Vertical space from applet to text
WIDTH=*pixels*	(Required) Applet display area
<AREA>	Describes one link on a mapped image
COORDS= *"pixels,."*	Left, top, right, bottom of link area
HREF= "*URL*"	Location to link to
NOHREF	This area isn't a link
SHAPE="RECT"	Rectangular map area
TARGET= *"frame"*	Links to indicated frame
<B>	Makes text bold
<BASE>	Changes defaults for URLs in document
HREF= *"URL"*	The new base for relative URLs
TARGET- *"frame"*	Specifies default frame for links

<BASEFONT>	Changes default for fonts in document
SIZE=*number*	Sets default font size (1-7)
<BIG>	Increases text size
<BLINK>	Causes text to blink
<BODY>	Starts the page content
ALINK="*color*"	Sets active link color
BACKGROUND="*url*"	Sets an image as page backdrop
BGCOLOR= "*color*"	Sets background color for page
LINK="color"	Sets unvisited link color
TEXT= "*color*"	Sets default text color
VLINK="co/or"	Sets visited link color
 	Starts a new text line
CLEAR=ALL	Starts next line below any images
CLEAR=LEFT	Starts new line below image on left
CLEAR=RIGHT	Starts new line below image on right
<CAPTION>	Sets a caption for a table
ALIGN=BOTTOM	Puts caption below table
ALIGN=TOP	Puts caption above table (default)
<CENTER>	Centers text and images across pages
<CITE>	Text format for citations
<CODE>	Text format for program code
<DIR>	A directory list
<DD>	Descriptor in definition list
<DL>	A definition list
COMPACT	Reduces list size
<DT>	Defined term of a definition list
<EM>	Emphasizes text (italic)
<EMBED>	Puts area for a plug-in onto page
ALIGN=align	Positions area relative to text

BORDER=pixels	Sets border color
HEIGHT=p/xe/s	Area size
SRC= *"url"*	(Required) Indicated document file
WIDTH=p/xe/s	Area size
<FONT>	Changes font attributes
COLOR=co/of	Changes font color
SIZE=number	Changes font to size number (1-7)
SIZE=+number	Increases font size (up to 6)
SIZE=-number	Decreases font size (down to -6)
<FORM>	Structures a data input form
ACTION= *"URL"*	Location to send data to
<FRAME>	Sets the attributes for a frame
MARGINHEIGHT=*pixels*	Space at top and bottom of frame
MARGINWIDTH=*pixels*	Space at side edges of frame
NAME=frame	Gives the frame a name
NORESIZE	Prevents frame borders from being moved
SCROLLING=YES	Frame has scroll bars
SCROLLING=NO	Frame doesn't have scroll bars
SCROLLING=AUTO	Frame has scroll bars if needed
SRC= *"URL"*	Page to put in frame
<FRAMESET>	Breaks screen into frames
COLS= " framesize,..."	Sets the width of frame columns
ROWS="*framesize,...*"	Sets height of frame rows
<Hnumber>	Headline lex! formal level no. (1-6)
ALIGN=CENTER	Centers the headline
<HEAD>	Indicates the page's header
<HR>	Horizontal rule line
AHGN=*alignment*	Positions line across page
NOSHADE	Flat line rather than shaded line

SIZE=*pixels*	Thickness of line
WIDTH=*number%*	Line width, as percentage of space
WIDTH = *pixels*	Line width
<HTML>	Identifies document as being HTML
<I>	Italic font
<IMG>	Inserts an image (graphic)
AlIGN=*alignment*	Positions image relative to text
ALT="*text*"	Text is displayed if graphic can't be
BORDER=pixels	Thickness of border around graphic
HEIGHT=*pixels*	Vertical size of image on page
HSPACE=pixels	Horizontal space between image & text
ISMAP	This image maps to multiple links
LOWSRC="*URL*"	Displays this image before SRC image
SRC=*"URL"*	(Required) Image to be displayed
VSPACE=*pixels*	Vertical space between image and text
WIDTH=*pixels*	Horizontal size of image
USEMAP= *"URL"*	File describes links for this image
<INPUT>	A form field
ACCEPT="*type,...*"	File types OK in file submission field
ALIGN=*alignmenlt*	Positions image field relative to text
CHECKED	Check box or option button is selected
MAXLENGTH=*number*	Maximum characters user can enter
NAME="name"	Gives field a name
SIZE=*number*	Size of field in characters
SRC=*"URL"*	Image file for button on form
TYPE=CHECKBOX	Check box (yes/no) field
TYPE=FILE	Field for submission of file
TYPE=HIDDEN	Field not seen by user
TYPE=IMAGE	Form submission button with graphic

TYPE=PASSWORD	Text entry field; text isn't displayed
TYPE=RADIO	An option select field (option button)
TYPE=RESET	Button that clears all fields
TYPE=SUBMIT	Form submission button
TYPE=TEXT	Single-line text field
TYPE=TEXTAREA	Multiple-line text field
VALUE= "*text*"	Default value for field
<ISINDEX>	Indicates page is a searchable index
ACTION= *"URL"*	Program to send search request to
PROMPT= "*text*"	Text appears on search form
<KBD>	Text in keyboard format (monospace)
<L1>	Start of new item on list
TYPC=1	(Default) Arabic numbers (1, 2, 3, etc.)
TYPE=a	lowercase letters (a, b, c, etc.)
TYPE=A	Uppercase letters (A, B, C, etc.)
TYPE=CIRCLE	Use circle as bullet (unordered list)
TYPE=DISC	Use dots as bullet (unordered list)
TYPE=i	Lowercase Roman numerals (i, xiv, etc.)
TYPE=I	Uppercase Roman numerals (I, XIV, etc.)
TYPE=SQUARE	Use square as bullet (unordered list)
VALUE=*number*	Sets entry counter for an ordered list
<LINK>	Shows relationship to another document
METHODS="method.." (Advanced)	*Lists functions documents supports*
REL="value,..."	(Advanced) Lists relationship of links
REV="*Value* ,..."	(Advanced) Reverses relationship of links
TITLE= *"text"*	Gives a name for the page link to
URN= *"URN"*	(Advanced) Resource name of document
<LISTING>	Text format with a fixed spacing

<MAP>	Describes what areas of image are links
NAME=*"name"*	(Required) Names the map
<MENU>	A menu list
TYPE=CIRCLE	Use open circle bullets on list
TYPE=DISC	Use dot bullets on list
TYPE=SQUARE	Use square bullets on list
<META>	Holds information to identify page
CONTENT="*text*"	(Required) The information being held
HTTP-EQUIV="*text*"	Relates info with HTTP response field
NAME= "*text*"	Name for the information
<NEXTID>	Machine-picked identifier for document
N="*text*"	Identifier for document
<NOBR>	Insert no line breaks into text
<NOFRAMES>	Browsers with frames skip this section
<OL>	Ordered (numbered or lettered) list
START = *number*	First value on list
TYPE=a	Lowercase letters (a, b, c, etc.)
TYPE=A	Uppercase letters (A, B, C, etc.)
TYPE=i	Lowercase Roman numerals (i, xiv, etc.)
TYPE=I	Uppercase Roman numerals (I, XIV, etc.)
TYPE=1	(Default) Arabic numbers (1,2,3, etc.)
<OPTION>	A choice on a form menu
DISABLED	This choice cannot be picked
SELECTED	This choice appears as the default
VALUE= "*text*"	Text sent to host if option is chosen
<P>	A text paragraph
ALIGN=*alignment*	Positions text across page
<PARAM>	Passes parameters to an applet
NAME=*name*	(Required) Name of attribute being set

VALUE=value	(Required) Value attribute is set to
<PLAINTEXT>	Treat rest of document as text
<PRE>	Preformatted text
<SAMP>	Text format for text samples
<SCRIPT>	A Java script
LANGUAGE="Javascript"	Indicates script language
SRC=*"URL"*	Script program file
<SELECT>	A menu field on a form
MULTIPLE	Allows more than one selection
NAME="text"	Name for the field
SIZE=number	Number of items visible at a time
<SMALL>	Use a smaller font
<STRIKE>	Display text with a line through it
<STRONG>	Highlighted text (usually bold)
<SUB>	Subscript text
<SUP>	Superscript text
<TABLE>	Create a grid
ALIGN=*alignment*	Position text within the cell
BORDER	Display a border on the table
BORDER=pixels	Display a border of a certain thickness
CELLPADDING=*pixels*	Distance between cell frame and content
CELLSPACING=*pixels*	Distance between cells
HEIGHT=*number%*	Table height as percentage of space
HEIGHT=*pixels*	Table height
WIDTH=*number%*	Table width as percentage of space
WIDTH=*pixels*	Table width
<TD>	Table cell contents
ALIGN=*alignment*	Horizontal position of text in cell
COLSPAN=*number*	Number of columns this cell covers

HEIGHT=*number%*	Cell height as percentage of table
HEIGHT=*pixels*	Cell height
NOWRAP	No line breaks in cell
ROWSPAN=number	No of table rows this cell covers
VALIGN=alignment	Vertical position of text in cell
WIDTH=*number%*	Cell width as percentage of table
WIDTH=pixels	Cell width
<TEXTAREA>	A multiline text field in a form
COLS=number	(Required) field width, in characters
NAME= *"name"*	(Required) Names the field
ROWS=number	(Required) Field height, in characters
WRAP=OFF	(Default) No word wrap
WRAP=PHYSICAL	Word wrap affects display and data
WRAP=VIRTUAL	Affects display but not sent data
<TH>	Table header cell (cell with bold text)
ALIGN=*alignment*	Horizontal position of text in cell
COLSPAN=number	Number of columns this cell covers
HEIGHT=*number%*	Cell height as percentage of table
HEIGHT=pixels	Cell height
NOWRAP	No line breaks in cell
ROWSPAN=number	No. of table rows this cell covers
VALIGN=*alignment*	Vertical position of text in cell
WIDTH=*number%*	Cell width as percentage of table
WIDTH=*pixels*	Cell width
<TITLE>	Sets page title, displayed in title bar
<TR>	Table row
ALIGN=*alignment*	Horizontal position of text in cells
VALIGN=alignment	Vertical position of text in cells
<TT>	Teletype format (fixed width font)

<UL>	Unnumbered list
TYPE=CIRCLE	Use open circle bullets on list
TYPE=DISC	Use dot bullets on list
TYPE=SQUARE	Use square bullets on list
<VAR>	Text format for program variables
<WBR>	Allows a break even in <NOBR> area

9.4.7. Creating Dynamic Web Contents

We have looked at how to publish mostly static information on the website, but many times we need to create truly interactive applications for the website. One can write scripts or external programs, using almost any 32-bit programming language, such as Perl or Windows CGI or ASP or Visual Basic or Java. One just has to make sure to use one of the standard server interfaces. Common Gateway interface or CGI is the traditional definition of how server and browser interact. CGI is not a programming language, but a definition of how the server and browser communicate. A CGI script is simply a script that conforms to this CGI standard.

Scripts are external programs that the webservers run in response to a request from the browser. When the visitor requests a URL that points to a script, the server executes it, and any output that the script creates is sent back to the browser for display. One can use a script for tasks as varied as creating an interface to a relational database system or creating own search engine, and anything in between; there are really no limits. CGI also allows the server to create new documents on the fly- that is, at the moment the browser requests them. The major benefit of CGI is that any CGI-compliant script will run on any CGI-compliant web server.

9.5. URL/INTERNET ADDRESS

URL stands for Uniform Resource Locator, which is just

a way of talking about an Internet address. Every resource available on the Web-HTML document, image, video clip, software program, etc. has an address that may be encoded by URL. So in the largest sense, the URL can be used to link anything on the web. The following are some examples:

Website homepage	http://www.computer.org
Specific file on web	http://www.stanford.edu/pub/schedule.html
FTP site	ftp://rtfm.rnit.edu
Image	ftp://www.sun.com/logo.gif
Database query	http://www.excite.com/search.gw?trace=a&search=laser+diode

9.6. GRAPHICS SOFTWARE

Unless one plans a text-only website, he needs some type of software to either create new graphics, convert existing graphics or photos or both. There is a wide variety of high-quality freeware, shareware and commercial software available for this purpose.

At a minimum, one needs software that can create or modify other image formats into both the GIF and JPEG formats. If one plans to include a lot of images on the site, or if some of them are large or are photographs, then one really wants to look for something more powerful that will let to edit an image's palette or compression ratio to optimize them for the fastest download times.

The actual process of creating graphics or photos is of course software specific. There are hundreds of software programs. Some simple guidelines to be followed to help graphics look good and load fast are:

– Keep the images small, i.e., its binary size or 'byte size'.

For example, an image of 30K can take 30 to view.

- Use WIDTH and HEIGHT tags in an image's HTML tagging, this speeds up the image loading.

9.7. WEB AUTHORING

Documents, Images and File Types are the three parts covered under web authoring.

Documents mean the computerized version of the word page–something that can store text, images and other formatting information and can be read somehow on the computer. This is in contrast to the word image, which specifically means a storage format for a visual image type that can be included within a document. Finally, the term file type refers to the actual format of a document, image, multimedia element, or other format, including:

- Simple ASCII text documents including HTML.
- Complex documents stored in a proprietary format, such as MS Word, Word Perfect, Excel, or Pagemaker, etc.
- Digital images stored in either proprietary formats such as photoshop or illustrator or in one of many standard compression formats as GIF, TIFF, EPS and JPEG.
- Digital sound files stored in a variety of formats, such as MIDI, AU and WAV.
- Digital movies or animations stored as quick time, AVI, AIFF, Shockwave or a similar format.
- Executable files that are part of or complete software programs, including Java applets.

9.8. SETTING-UP FREE WEBSITE

To set up a site, one will need space on a web server to

store all HTML documents. There are a lot of sites on the Net that give free web space. Select one that meets the requirements. We can use Geocities for an example.

1. Goto-www.geocities.comandSignin.
2. If you are already a member of Yahoo, type in your user name and password, else sign in as a new member.
3. Next you will be asked to fill in a few details, like the description of your page, a topic that best describes your page, like movies, pets, business and finance, etc.
4. After filling in these details, click on the Submit button.
5. The next screen displays your Yahoo_ID and a URL for your site: URL stands for Uniform Resource Locator and IS the key to uniquely identify your site.

After creating the contents, you will need a program to upload your site. FTP stands for File Transfer Protocol and is a way of transferring files to and from computers on the Internet. An FTP client program (FTP client) sends a request to an FTP server program (FTP server) asking to exchange information and transfer files. The server then verifies that the user is authorized to send or receive files and responds to the request accordingly.

Numerous graphical FTP client software packages are available as freeware or shareware. One of the best client software available on the Internet is WS-FTP. You can download it from www.tucows.com or www.ftppro.com.

On performing the above-mentioned steps, your site becomes up. Type in the URL in your browser and check that every page is showing as you expected it to be. To be doubly sure, check in both Internet Explorer and Netscape Navigator. The page could show differently on the two browsers, or even on different versions of the same one.

9.10. REGISTERING YOUR DOMAIN NAME

The first thing to do is to get an address for the website in cyberspace. This is called domain name registration, for example, www. yourcompany.com. Domain name registration is done through the InterNIC–an organization that manages a database of all domain names registered so far and is a collaboration between National Science Foundation of the US, AT&T, and Network Solutions. One can register a domain name with Network Solutions, AT&T manages the database and funding is provided by the National Science Foundation.

There are two broad types of domain names–the generic top-level domains of .com, .org, .net, .mil, and country-specific domain names like .in for India and .sg for Singapore.

One can register domain name as .com if the organization is a commercial one, .org if it is a non-profit organization, and .net if it is any business. Once a domain name has been assigned, it will be reserved for the number of years one has registered it for.

9.11. HOSTING WEBSITE

When it comes to hosting, there is a wide range of options available in the form of hosting companies and ISPs. They provide space on their servers for any website. To choose one, one needs to look at various factors, including the price one has to pay, the space provided, and services the provider offers, including the kind of access provided, server-side programming support (cgi-bin access), and e-mail services. The amount of space depends on the content and how exhaustive or interactive the site would to be.

Traditionally, web servers were hosted in the US. But if most of the traffic is coming from India, one can consider co-hosting server with an Indian ISP. This could often work out to be cheaper.

9.12. SEARCH ENGINES FOR WEBSITES

The Internet provides access to an enormous number of databases distributed around the world and to a variety of scientific facilities, including digital libraries, unique databases, supercomputers and remote scientific sensing instruments. It collectively offers tremendous potential for collaborating and for sharing resources, such as documents software data and network services. Accessing different databases available in different laboratories/institutions facilitates research in interested areas.

A search engine is a program that searches through some dataset. In the context of the web, the word search engine is most often used for search forms that search through databases. Search engines are constantly looking for ways in which to increase their user base. The search engine can interrogate a user request and then provide either updating services or suggestions as to potentially useful sites. Some of the search engines are:

Altavista-www.altavista.com and Infoseek-www.infoseek.com have their own particular approaches in managing the web. They are useful as they give quick answers to reference questions and general research. Some of the services are good for exhaustive trawling but when searches return thousands of sites the effectiveness of the service becomes questionable. Altavista is probably the most powerful web searching facility with an exhaustive database and the capability to search USENET newsgroups as well as websites. The query language is also powerful.

Ask Jeeves is an example of a tool that tries to imitate the experienced librarian. Ask a question and it will respond with several more in an attempt to elicit more accurate details of what one really wants. The interesting feature about Ask Jeeves is that it uses natural language processing to understand and match user's questions to an extensive

knowledge base. The knowledge base consists of thousands of researched answer links to web sites compiled by research staff. The publicity material proudly claims supremacy over other search services precisely because the knowledge base is built by human not by software spiders. Ask Jeeves appears to offer a new role in building the knowledge base for particular domains. As the web browser has become an ubiquitous feature in offices and homes, several traditional online hosts now provide web front ends, a trend which is to be encouraged.

Yahoo! is one of the stable of products produced by the Yahoo Corporation and is an unsurprising development in the world of search engines. It employs editors and librarians to catalogue and organize the sources it references. It allows the user to create their own user profile. Science Direct Service provides online articles, access to the full text of more than 1000 scientific medical and technical journals by the worlds leading scientific publisher. The service is only through subscription or license.

Actually not everyone on every occasion will feel that it is appropriate to do their searching on Internet. When time is short, the search is complex or the source unfamiliar; they might turn to expert searches, and there are many situations in which paying an expert is the easiest and wisest.

Search engines are one of the primary ways that Internet users find web sites. That is why any user with a good search engine may see a dramatic increase in traffic. Many websites appear poorly in search engine rankings or may not be listed at all because they fail to consider how search engines work. With the exploding number of sites, search engines are getting more sophisticated; therefore it is important to know the features of the good search engines available on Internet and finally decide which would be best for one's web pages.

9.13. SUBMISSION OF WEBSITE

What is the point of having a site if the world does not know about it? So, after one has designed and uploaded site, it is very necessary to let people know of site's existence.

One of the most important things one could do to increase traffic to site is getting listed in the major search engines. There are two ways to do it:

Automated Submission : There are a few sites on the net that quickly submit one's web page to many search engines at once. This is easy, but usually produces only mediocre results. Here are some sites that do the submitting for any user:

- http://uswebsites.com/submit
- http://www.netcreations.com/postmaster
- http://addme.com

Manual Submission : One could submit site to each of the major search engines, one by one. The sites on the search engines are arranged in various categories like, education, entertainment, etc. To submit the site, first select an appropriate category and then click on the 'Submit your site' or 'Add a URL's button from the end of the category page. Some of the search engines where one can submit site are:

- www.lycos.com
- www.altavista.com
- www.webcrawler.com
- www.infoseek.com
- www.yahoo.com
- www.khoj.com

Search engines have their own rules for indexing sites.

9.14. TECHNICAL ASPECTS TO BE KEPT IN MIND

Some of the technical aspects to be kept in mind are discussed below :

- Language selection is must with the webmaster for web developing;
- Select an available domain name for the site and register it with an appropriate domain registry;
- Choose a web host and contract with them to host the site on their web server;
- Determine the basic architecture and organization of the site which should be selected to serve the intended purpose of the site;
- Choose the design elements that control the look of the site including common theme elements, page layout, color scheme, etc.;
- Select a navigation system - the component of the site that provides a user interface for moving around the site and finding what is desired.

Navigation is perhaps the most important aspect of usability when designing an effective website. Users must be able to browse the contents of your website easily and be able to navigate back to a project's homepage and the center's homepage. The top, bottom, or side of a web page are the best places to put links for navigation. One way to ensure proper accessibility is with a navigation bar. The navigation bar is the most important part of the web page when referring to usability. Having a navigation bar on your center's main website is a must. This allows your online community to access not only your project's web pages, but your entire center's website as well. The navigation bar should include all the pages that make up your center's entire site. If you do not put your projects in the navigation bar, be sure your online

audience can access the projects from your center's homepage. Navigation bars can be placed anywhere on a web page, but they generally look and work best on the left side or top of a web page. Navigation bars consist of links, and can be designed in many different ways. For example, the main navigation bar for the OSU Library EPC resides on the left-hand side of our web pages, and consists of bulleted text links to our projects and other EPC-related web pages see Fig. 9.8.

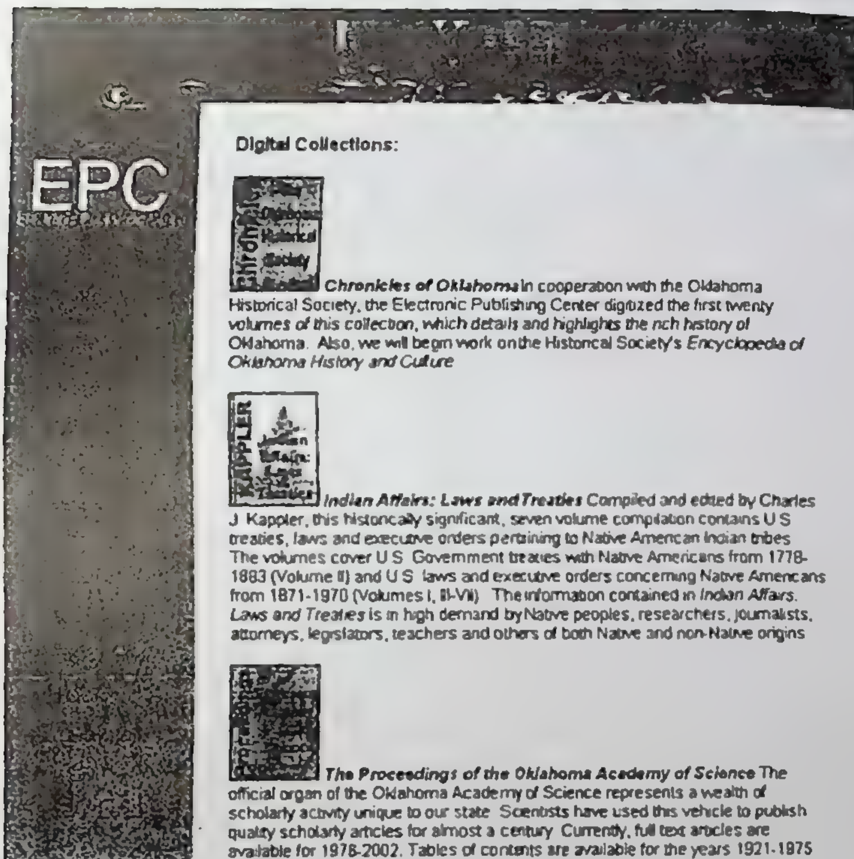


Fig. 9.8. EPC Homepage with Left-hand Side Navigation Bar

Many navigation bars are made up of bulleted text links, icons, or images. Remember, without proper site navigation your site will not appeal to the online community, and your

projects might not have the impact they could if only they were easier to browse.

Making sure your online audience can find information quickly and with as few clicks as possible is an essential part of usability and navigation, especially if you want your projects to have as much exposure and potential as they possibly can. Straightforward site navigation with links that allow users to easily explore and backtrack within your site can provide them with a wonderful online experience.

Determine the substantive content of the website - what actually goes onto the website, how it is said and what supporting graphic or other media are included. Construct the website- web designer implements the plan stated in steps by programming and scripting the pages of the site. Publish the website- the completed website is made available to the Internet public by placing it on a web server at an address tied to the domain name as registration for site; and Promote the website-index the website on search engines and set up links from related sites, and market the site, so it can easily be found and accessed by intended audience.

Then, as stated earlier, you need to make sure your audience and the major search engines know your site is online. Search engines have links that let you submit your site to them so it will be included when they search the Web. The best search engines will find you anyway using their spiders (an indexing tool that scans your pages from top to bottom in order to register the content in a search engine), but they will find you sooner if you submit your site to them. You will receive e-mail offers to register your site with search engines. It is not worth spending the money for these services when it is simpler to register your site with the major engines yourself. Save those funds for another purpose.

Lastly, to inform your potential audience of the debut of your site, you can issue press releases to newsletters or

journals in the field, and post announcements on e-mail discussion lists. Presentations at professional conferences give you the opportunity to demonstrate your site to potential users. Articles for professional journals also provide a forum for describing and promoting your site. The website is an electronic resource to be included in your library's online catalogue. If you are a member of a cooperative catalogue you can submit the catalogue record for the site to their union catalogue.

9.15. KEEPING STATISTICS

When the users do start to come, you need to keep statistics on the number of visits your site receives. These numbers can be used to justify the expense of creating and maintaining the site, to prove the value of what you are doing to your administration, and to evaluate the success of your site. Funding agencies frequently require such evaluations. To acquire the statistics for hits on your website, work with your information technology staff. They may already have software installed that keeps track of hits that can be broken down by time period, area of the website visited, and length of average visit. If they are unable to assist you, you can download free webcounters that will record hits on your site. Statistics can also provide useful feedback for you. If the usage is unexpectedly low, consider additional ways to promote and publicize your site. If the length of the average visit is not what you expected, you might analyze the navigability of the site to determine if users are getting frustrated and leaving.

Thus, directly going through the URL, searching and access of information can be done. But information searching itself is a complex process; which need cautions while going for searching.

9.16. INFORMATION SEARCHING - FOUR-PHASE FRAMEWORK

Information searching involves a number of stages and at each stage a number of actions are taken and decisions made. The information retrieval system and the user interface may provide support in performing these actions and in making appropriate decisions. Shneiderman, Byrd and Croft divide the major activities in an information search process into four major phases – formulation, action, review of results, and refinement.

They propose that this four-phase framework for interface design will provide a common structure and terminology for information searching while preserving the distinct features of individual digital library collections and search mechanisms. The four phases are given below:

9.16.1. Formulation

The formulation of a search is triggered by an information need, and several decisions are made regarding sources, fields, what to search for, and the search variants. The selection of sources is an important step in a search process. In a digital library environment, users may have access to many collections, and each collection may have one or more databases. Users need to have some idea about the nature and content of the collections and databases and use this to make a selection.

Some digital library interfaces show a list of the available collections and allow users to select one particular collection; for example the Greenstone Digital Library allows users to select one particular collection to browse or search, and NDLTD allows users to search for the theses of a selected university or universities. The selection of sources to search is not always an easy task, especially for new and novice users. Some systems provide support for this. In this case,

users are asked to enter a search expression, and then the system searches across the databases and produces an output of best-matching databases instead of best-matching records. This gives the user an idea of the content of the collections and thus facilitates the selection of sources.

For example, in Dialog, the Dial Index option allows users to search across a range of databases to get a list of those that best match their chosen search topic. A search may be conducted against one or more selected fields in a database. A search on specific fields produces more specific search results than one on a complete record. However, it is sometimes difficult for the user to decide which field to search. This calls for a familiarity with the structure of the chosen data-base and also with the nature and content of the fields. Users may go to the help files, or to some other source, for example to the blue sheets in the case of a Dialog database search.

Some systems provide search interfaces with structured fields. For example, in the ACM digital library's advanced search interface, users can select a number of fields to which to restrict a search. Similarly, in THOMAS – a digital library service of the Library of Congress, users can select a number of fields with which to conduct and/or restrict a search for congressional records, A major challenge for users comes in writing the actual search statement A search statement tells the system what to search for in the chosen databases. Various techniques are available for specifying how the constituent search terms are to be looked for, for example by using appropriate search operators.

The search operators are not always intuitive and are purely dependent on the chosen system. Users need to be familiar with the various operators and the conventions appropriate for the chosen search system. A search term may be represented in a variety of ways. Users may want to choose

a given search term or phrase that appears in the database records in a variety of ways, for example in singular plural forms, in various synonymous forms, with variant spellings, and so on. In such cases it can be very difficult for the user to decide which form or variant of a search term to use. The user interfaces of digital libraries often help by allowing for case sensitivity, stemming, phonetic variants, synonyms, abbreviations, broader and narrower terms, and stop words.

9.16.2. Action

The second phase is action. Usually a search button needs to be pressed to conduct a search, although in some cases the user just needs to press <CR>. Once the search begins, the user is usually expected to wait till the search process end. Sometimes, this may take a long time and thus be frustrating. In some cases, the interface prompts the user that the search is being processed; it may also tell the user about the progress of the search. A very appealing method of information searching is 'dynamic queries', a system where there is no search button and the result set is continuously displayed and updated as phases of the search are changed.

9.16.3. Review of Results

Information retrieval interfaces usually offer the user various choices for viewing results such as the size of display, display format and the order of the retrieved items. Some interfaces use different visualization techniques for the display of search results. Some interfaces also use helpful messages to explain the results, for example the degree of relevance. Some digital libraries, for example the California Digital Library, shows results from different collections separately.

9.16.4. Refinement

Refinement is the fourth phase. Different search interfaces provide different facilities for modifying and refining

queries. In some cases, users need to reformulate the search statement and conduct a new search, while in others users can refine a search and conduct a new search on the retrieved set. For example, in Dialog search, each search is automatically given a set number, and the user can specify any search set on which to conduct a refined search.

Many digital library interfaces also support relevance feedback, a system where the user selects some retrieved output as relevant and the system conducts a new search based on the characteristics of the items identified as relevant. Mitchell comments that the user interface is the means by which information is transferred between the user and the computer and vice versa. He further comments that well-designed user interfaces should allow users to find and use the information that the information system provides access to more efficiently.

In fact a good user interface greatly enhances the quality of interactions with information systems. Interface design encompasses what appears on the user's screen, how they view it, and how they manipulate it. Functional design specifies the functions that are offered to the user such as selecting parts of a digital object, searching a list or sorting retrieved output, obtaining help, and manipulating objects that appear on the screen. Almost all present-day PCs have a user interface that is based on the style derived at Xerox PARC and made popular on Apple Macs, and uses the metaphors of files and folders on a desktop.

Shneiderman, the Guru of HCI (Human-Computer Interaction) and user interface design, proposes a number of guiding principles for the design of user interfaces:

– Strive for Consistency : Terminology, layout, instructions, fonts and colour should be used consistently throughout the interface.

- **Provide Shortcuts** : Also provide shortcuts for skilled users.
- **Provide Informative Feedback** : The system should provide users with appropriate feedback about the sources and what is being searched for.
- **Design for Closure** : Users should know when they have completed searching the entire collection or have viewed every item in a browse list.
- **Permit Reversal of Actions** : Users should be able to undo or modify actions, for example they should be able to modify their queries, or should be able to go back to the previous state in a search session.
- **Support User Control** : The user should be able to monitor the progress of a search and should be able to specify the parameters to control a search.
- **Reduce Short-term Memory Load** : The system should keep track of some important actions performed by the users and should allow them to jump to a formerly performed action easily, for example to a former query or to a specific result set.
- **Make Error Handling Facilities Simple** : Users should be able to rectify errors easily, and all error messages should be clear and specific.
- **Provide Plenty of Space** : A lot of room should be made available for entering text in search boxes.
- **Provide Alternative Interfaces** : Separate interfaces should be available for expert and novice users.

Interface design is pivotal to the effective use of an information system, and that the application environment of information retrieval systems has its own distinctive needs and characteristics that need to be understood and addressed in design. An interface designer must make decisions about

how to arrange various kinds of information on the screen and how to structure the possible sequences of user-system interactions. Marchionini provides a description of the essential features of interfaces to support end-user information seeking and suggests five information-seeking functions, namely problem definition, source selection, problem articulation, result examination and information extraction. He argues that much interface work has focused on problem articulation and that the other functions need to be investigated in designing information-seeking interfaces.

Marchionini and Komlodi discuss the evolution of interfaces and trace research and development in three areas, namely information seeking, interface design and computer technology. They provide a brief review of interfaces to online information retrieval systems as well as to online public access catalogues or OPACs. They also discuss the new generation of user interfaces influenced by the emergence of the web. They conclude that interface design has become more user-centred and that the trend is toward more mature interfaces that support a range of information-seeking strategies.

Savage-Knepshield and Belkin discuss the trends related to interface design challenges within the context of information retrieval interaction. They divide the period into three major eras, which they refer to simply as the early years, the middle years and the later years, and provide a description of the types of interfaces designed in each. Command language interfaces provided the main approach in the early years. In the middle years menu-driven and form-fill-in interfaces, which were more appropriate for novices and casual searchers, became the dominant interface type.

In the later years, users and their information needs became the focus of the most complex interface design challenges. This period is characterized by use of the natural language and direct manipulation user interfaces. The authors

note that the degree of interaction between the searcher and the information retrieval system has dramatically increased but that much research is still required to meet the challenges in interface design for information retrieval interaction. Hearst discusses user interface support for the information-seeking process and describes the features of these interfaces that aid such processes as query formulation and specification, viewing results and interactive relevance feedback. She describes a number of graphical user interfaces that provide information seekers with a wide range of approaches to specify, view, analyze and evaluate queries and documents within the context of information retrieval systems.

Interfaces that support the formulation of Boolean and natural language queries as well as those providing categorical and subject support are examples of those reviewed. Hearst points out that there is an increasing interest in taking the behaviour of individuals into account when designing interfaces.

9.17. SEARCH ENGINES - FURTHER EXPANDED

However, search engines have been discussed in 9.12 under website development, but here these are further expended. If you do not have a specific URL, or list of URLs, to connect to, you will need to search for the information you are after on the internet using a search engine. With a search engine you type in a word or phrase that describes the information you need, the engine searches its index for this word or words, and returns a list of websites that match the words; you just click on the link to each site on the list to connect to that site. If you enclose the words in double-quotes it treats it as a phrase search, otherwise the words can appear anywhere in the document; engines vary as to whether (and if so how) they apply the Boolean 'and', 'or', and 'not'. Advanced search options are also usually available to allow you to narrow or broaden searches.

9.17.1. Parts of Search Engine

A search engine is a collection of software programmes that collect information from the web, index it and put it in a database to make it searchable. It allows user to type a word or phrases also called a 'query' into a search box and the search engine displays link to relevant pages, Search engine is a system usually based on an index of several HTML documents. The main parts of a search engine are Spider, Index and the Search Interface.

Spider : Spider or Crawler or Gatherer or Robots are the special programmes by which search engines are automatically updated. Spider visits the web pages and reads the information found. It crawls the network continuously for gathering content descriptors from the document collection for updation of databases. Spiders search the world wide web from site to site for new content and then report their findings to the database. Robot visits to an internet site and it gathers keywords and stores them. When users search, its search results are gathered by relevance to the query. Web spiders traverse the web almost every day so that, the latest addition to the web index can be retrieved

Index : It is also often referred to as a catalogue. Indexes are normally generated using spiders. Index is like a giant book, which contains a copy of every page on the web that the Spider has found. Index may be full text index (e.g. Altavista) or keyword index (e.g. Lycos and Excite) or it may also use libraries who review web documents and index them manually for retrieval. Indexing quality has an overwhelming effect on retrieval.

Search interface : It is an interface between user and database which matches and display relevant results. When users type a query/ keyword into a search box, Search Interface collects it and submit to the database and display results. It is a programme that receives user's search request,

compares it to the entries in the index and returns results to users.

9.17.2. Types of Search Engines

There are several categories of search engines:

– General Search Engines
– Regional Search Engines
– Subject-Specific Search Engines
– Meta Search Engines

General Search Engines : These are general type of search engines generally covering range of services and facilitate Boolean search. Examples are given in Table 9.4.

Table 9.4. General Search Engines

Search Engines	Search Options	Additional Features
AltaVista http://www.altavista.com/	• Best match; implied boolean; full Boolean • Full range of limit fields • Family filter	Full range of services including "Directory" subject gateway.
Excite http://www.excite.com/	• Best match; implied Boolean; full Boolean • Limit by language, country and domain	Full range of services including limited subject gateway.
Google http://www.google.com/	• Best match; implied Boolean	Includes a directory service in addition to the search engine database. Several options given in the advanced search page for refining searches. Provides links to related

		information once the search is completed. Superior and innovative search engine that uses the number of links to a site to rate its importance. An 'I'm feeling lucky' button automatically takes you to the first Web page - i.e. the best result/match - returned for a query. Click on the bar graph at the beginning of the result to see which pages link to the particular page.
Northern Light http://www.northernlight.com/	• Best match; implied Boolean	Extensive range of additional search services, including option to search the "Special Collection" of over 5,400 high quality web resources.

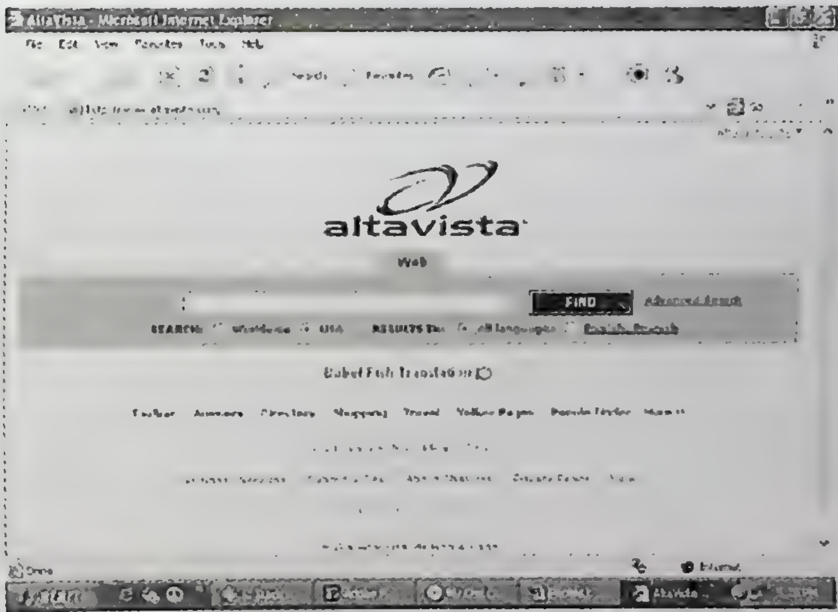


Fig. 9.9. Home Page of Altavista.com

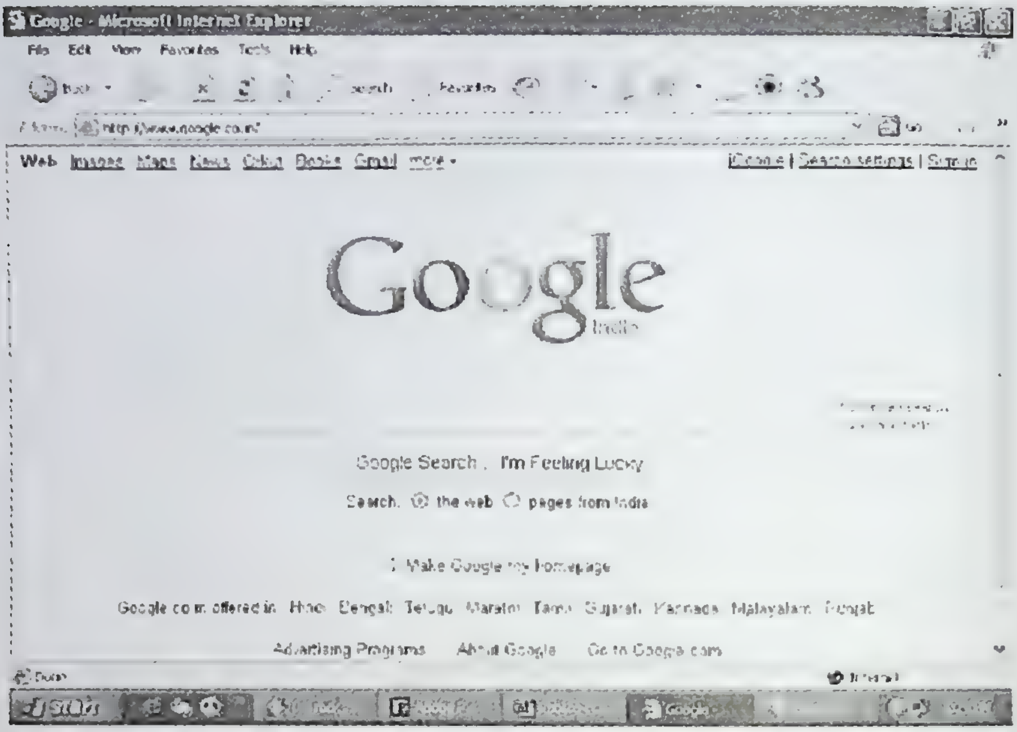


Fig. 9.10. Home Page of Google.com

Regional Search Engines : Being region - or - country specific are best for locating varied resources region-wise. Important onces are given in Table 9.5.

Table 9.5. Reasonal Search Engine

Curry Guide (U.K.) http://www.curryguide.com/	• Best match; (limited) implied Boolean	Range of services including "Select" subject gateway.
EuroFerret (Europe) http://www.euroferret.com/	• Best match; implied Boolean • Limit by country or language • Query narrowing	Service available in five European languages other than English.
EuroSeek (Europe) http://www.euroseek.net	• Best match, implied Boolean • Limit by European country, international region, domain and language	Full range of services including "Web Directory" subject gateways.

Exite UK (U.K.) http://www.excite.co.uk/	• Best match; implied Boolean • Limit to UK, European, Excite Channels or News	Full range of services including UK-orientated subject gateway.
Lycos UK (*U.K.*) http://www.lycos.co.uk/	• Best match; implied Boolean • Limit searches by the U.K., by particular file types, by title or URL, or by a selected web site, and by language.	Full range of services including "Webguides" subject gateways. Versions of Lycos available for a range of countries.

Subject-Specific Search Engines : Search engines are devoted to the interests of specific subject professionals. Examples include as shown in Table 9.6.

Table 9.6. Subject-specific Search Engine

Service	Search Options	Additional Features
Biochemistry Easy Search Tool *(Biochemistry)* http://www.worthington-biochem.com: 8080/	• Best match; (limited) implied Boolean	UK subject gateway available.
GeoIndex *(Geography / Environmental Studies)* http://www.geoindex.com/	• Best match; implied Boolean	Range of geo-environmental resources available, including news service and company directory.
Health World Search (*Health sciences)* http://www.healthy.net/ Architext/ AT-Completequery.html	• Full Boolean	Range of additional services.

Meta Search Engines : Limit search to particular types of information. They are sometimes also called meta-crawlers or multi-search engines, that enable users to search across more than one search engine. The results are then presented together, generally in one page. Examples are shown below in Table 9.7.

Table 9.7. Meta Search Engines

Service	`Search Options	Additional Features
MeteCrawler http://www.metacrawler.com/	• Best match • Implied Boolean • Limit search to particular types of information	None.
Savvy Search http://www.savvysearch.com/	• Best match • Implied Boolean • Limit search to particular types of information	Designed to query 19 search engines simultaneously. Users input their search and specify the number of results desired from each engine and the results are then displayed in groupings according to the different search engines.
The BigHub.com (http://www.isleuth.com/) Formerly known as iSleuth.com	• Best match • Implied Boolean multi-search engine covers over 3000 searchable databases	Includes a range of specialist search tools, such as rating and reviewing services, news services as well as general search engines.

Yahoo! offers a hierarchically organized directory of subject categories as well as a standard search engine; the result of a query is a list of relevant categories, a list of sites and, at the bottom, a list of other search engines where the same query has been tried. This variety of approaches makes it a good first engine to try.

Google has become very popular recently owing to its simplicity and uncluttered appearance, its user-friendliness and intuitive feel, and the way it lists hits according to how many links there are to the sites listed, so that the most 'important' should be towards the top. Google also offers a Web Directory based on the categories in the Open Directory project (www.dmoz.org) - a directory constructed by unpaid volunteers contributing from the www community; this is a sort of combination of searching and category browsing.

These engines sift through literally billions of pages of information, but even so they are only partially covering total web content. Google, for example - one of the most complete engines, with some 1.34 billion pages indexed - still only manages about 56 percent coverage. And that's apart from something called the 'Deep Web', estimated to be some 500 times larger than the surface web, with some 550 billion documents, 95 percent of it freely, publicly accessible.

The disadvantage of all the general search engines is the vast amounts of irrelevant, trivial, misleading stuff they retrieve, but this is an inescapable concomitant of the freedom of the web. The problem is trying to find as much as possible of the really high-quality, relevant content on the web that is often in danger of being swamped by the rubbish. A related danger is that many users have an uncritical faith in the quality of web sources. This only emphasizes the need for user education in the area of quality guidance.

So, rather than using a general search engine, a subject gateway may be more useful. These provide searchable and browsable catalogues of websites, based on subject areas, and selected according to quality criteria. Many subject gateways can be found through the Argus Clearinghouse and Pinakes. The Resource Discovery Network (RDN), aimed at the UK FE and HE communities, provides access to a number of faculty-level hubs, each a service in its own right containing

a number of related subject gateways. Cross-searching is an important feature of RDN – you can search across an individual gateway, across all the gateways in a hub or across the whole of RDN.

9.18. RESOURCE DISCOVERY NETWORK (RDN) - THE ELIB SUBJECT-BASED INFORMATION GATEWAYS

Subject portal development was initiated by a concern of how to deal with the pressures on library resources caused by the rapid expansion of student numbers and the world-wide explosion in academic knowledge and information. As a sequel to this, an investigation was undertaken in UK in 1993 which led to the Electronic Libraries Programme, e-Lib (http://ukoln.ac.uk/services/elib/) - a centrally funded national programme of research in the UK into the role and development of electronic library. There are several themes of eLib and one of them deals with, 'access to networked resources' and it is within this area that Subject-based Information Gateways were developed as part of the *Joint Information Systems Committee's* (JISC) (http://www.jisc.ac.uk/) e-lib project - a quality tested databases of Internet resources described and catalogued by specialists in UK higher education institutions and other partner organisations. Examples include:

- ADAM (http://www.adam.ac.uk/), the Art, Design, Architecture and Media Informatics Gateway.
- Bizled (http://www.bized.ac.uk/), the Business and the Economic Gateway.
- EEVL (http://www.eevl.ac.uk/), the Edinburgh Engineering Virtual Library.
- OMNI (http://www.omni.ac.uk/) (now BIOME - a hub within RDN) (http://www.biome.ac.uk/), organising

Medical Networked Information.

- RUDI (http://www.adam.ac.uk/), Resources for Urban Development Information.
- SOSIG (http://www.sosig.ac.uk/), the Social Science Information Gateway
- HUMBUL (http://www.humbul.ac.uk/), the Humanities Information Gateway.
- PSIgate (http://www.psigate.ac.uk/), for Physical Sciences.

Resource Discovery Network (RDN) is the network behind the development of *portals* which is a network of subject experts and a distributed organizational structure - collaborating to deliver portal services. The RDN is developing prototype portals as part of the *JISC's Distributed National Electronic Resource (DNER).* These portals will add content from the JISC's collections to RDN's data and make data from a variety of distributed datasets and a variety of publishers available to users through a single interface. DNER vision encompasses many kinds of presentation services, including.

Subject portals	-	pertaining to specific subjects
Image portal	-	pertaining to specific image resources
Geo-browser portals	-	pertaining to geo information resources
Shallow portal	-	portals that facilitate linking only
Deep portal	-	provide richer discovery and use functionality including cross-search

The Fig. 9.11 gives the schematic representation of the subject based information gateways that have been developed as part of the project.

These gateways present a selection of relevant heterogenous resources, and each of them is slightly different. However, most provide access to a searchable and browsable database of Internet resource descriptions within their particular subject area. Resources are selected and evaluated by library professionals and/or subject experts. Records are then manually created to provide meaningful and informative descriptions, and resources are also described using traditional cataloguing and classification methods to enable more effective retrieval. The resources include journal articles, abstracting and indexing tools, union catalogues, search engines, image collections, resource catalogues, etc. RDN enterprise comprise various *hubs* as reflected in graphics below like SOCIG, Humbul, Biome, and the like. While each hub has a unique identity, it is possible to search across several hubs simultaneously and there is now an overall collection development policy. The ethos of the original gateways has remained the same - a catalogue of descriptions of selected and evaluated materials within a specified area.

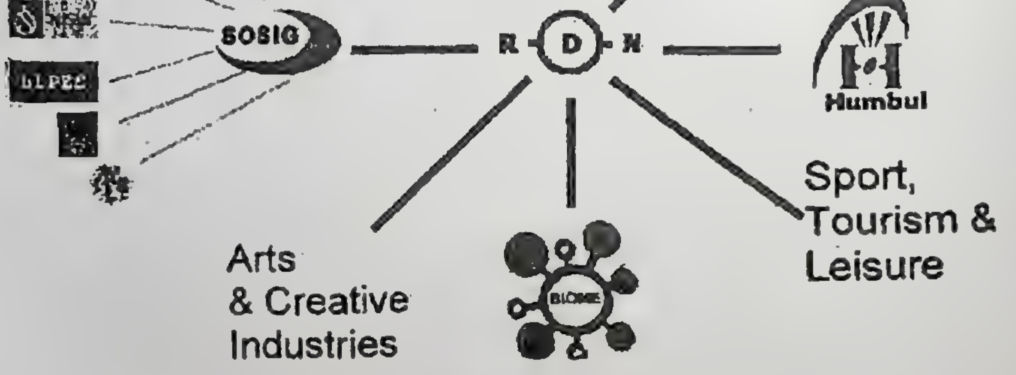


Fig. 9.11. Resource Discovery Network (RDN) Enterprise

The Argus Clearinghouse (http://www.clearinghouse.net/) : Central access point to more than 1,200 topic-specific guides to Internet resources, each of which is critically evaluated.

BUBL Link (http://bubl.ac.uk/link/) : A national (UK-oriented) information service for the, higher-education community. Links to over 10,000 quality Internet resources covering all subject areas, and sub-divided by type. Search or browse, excellent for tracking down UK institutions.

Infomine: Scholarly Internet Resource Collections (http://infomine.ucr.edu/) : The Scholarly Internet resource collection of over 23,000 academically valuable resources offers a wide range of services in various areas. INFOMINE is a virtual library of Internet resources relevant to faculty, students, and research staff at the university level. It contains useful Internet resources like databases, electronic journals, electronic books, bulletin boards, mailing lists, online library card catalogues, articles, directories of researchers, and many other types of information. INFOMINE is librarian built. Librarians from The University of California, Wake Forest University, California State University, The University of Detroit - Mercy, and other universities and colleges have contributed to building INFOMINE.

The Internet Public Library (http://www.ipl.org/) : The Internet Public Library (IPL) is a public service organization and a learning/teaching environment at the University of Michigan School of Information. This is a guide to type of resources which might be found in a public library. It provides an annotated collection of high quality Internet resources, selected by IPL staff for their usefulness in providing accurate, factual information on a particular topic or topics. Besides it all also contains original resources developed or hosted by the IPL.

9.19. OTHER SEARCH TOOLS – FOR SPECIFIC RESOURCES

The options for searching the Internet are far more extensive than what has been discussed above. There are specialist search facilities for searching specific types of resources like *software, reference materials, Usenet newsgroups, discussion lists, images, Invisible web or Hidden Web or deep webtools* for searching across several databases simultaneously, etc. Besides specialist services are available for searching news information, searching e-mail address, and people, etc. For instance, many search engines index material produced in HTML only, thereby other formats get unnoticed. So in order to find information in formats like PDF other than HTML many tools have come up such as *Search Adobe PDF online (http://searchpdf.adobe.com/)*- which allows you to search for over one million PDF documents. Similarly for locating images and other audiovisual materials, one could look at *Corbis* (http://store.corbis.com/) and *view images* (http://www.viewimages.com/). Specialist sources of images and other audiovisual materials also exist. Within medicine *BioMed* (http://www.brisbio.ac.uk/) is presently one of the best collections of biomedical images available via Internet. For searching newsgroups and mailing lists *Deja.com; JISCmail (http://www.jiscmail.ac.uk/);* and *Mailbase (http:// www.mailbase.ac.uk/)* and the like are available. For regional or subject specific information, subject gateways, subject portals and hubs are available as discussed under subject gateway and virtual libraries.

The current search engines do not search certain resources that are by and large quality resources, which are not contained in the web pages, and not in the public domain. Such resources are called *'Invisible web' or 'Deep Web' or 'Hidden Web'*. The information contained in such resources cannot be indexed by the search engines due to various

reasons, such as –

- either it is hidden behind a search interface, such as in a database, or
- behind a login screen, such as papers in electronic journals.

Therefore using such search engine restricts inclusion of potentially high-quality information. Searching the invisible web is fairly a new concept, hence search tools are limited in terms of their capabilities. However this area is receiving considerable attention presently. Tools for accessing invisible web are being developed and presently such tools have limited scope in the sense that they only direct users to the relevant locations. This is the approach adopted by gateways and virtual libraries, which include the description of invisible databases and journals, but you need to connect to each site individually to search contents.

Tools like *InvisibleWeb.com (http://www.invisibleweb.com/)*, a catalogue of invisible resources; *CompletePlanet (http://www.completeplanet.com/)*, a directory of almost 40,000 invisible web resources also directs users to hidden web locations.

InvisibleWeb.com (http://www.invisibleweb.com/) is the search engine of search engines developed by IntelliSeek, Inc. The InvisibleWeb.com is a directory of over 10,000 databases, archives, and search engines that contain information that traditional search engines have been unable to access. Invisible Web.com takes you to these invisible sources.

Classic search engines such as Yahoo or AltaVista are just too large. They work just like the index at the back of the book; you give the engine a word on. You do not want to wade through futile, repetitive information; you want targeted, precise information and that is exactly what InvisibleWeb.com

delivers! It takes you directly to the interactive website that is connected to the information you need. Invisible Web is used whenever you want to find targeted information.

In addition, these are subject catalogues and directories, which perform similar functions, hence have been put together. Unlike search engines, subject catalogues or directories are created by humans. Sites are re-submitted by their authors or identified by the site developers and then assigned to an appropriate subject category or categories by the catalogue maintainers. Thus, the basic resources are covered under subject listings or indexes in the resource directory. Subject catalogues tend to be both searchable and browsable through a hierarchy of subject headings. The best way to start is to investigate a general subject listing, like *Yahoo or BUBL LINK* (which is maintained in DDC order by librarian volunteers) or collections of specific guides to various resources, like those maintained by the *Cleainghouse of Subject-Oriented Internet Resource Guide.* Some popular Subject Catalogues and Directories are:

Yahoo! (http://www.yahoo.com) and (http://www.yahoo.co.uk) is probably the best of the mainstream portals. Yahoo is not a search engine, but a directory presented as a hierarchical subject index, which can be searched. A good starting point for searching for more broad or general rather than area-specific information. Also has good sections on reference resources, libraries, publishers, etc.

Galaxy (http://www.galaxy.com/) was initiated in 1993 and went live in early 1994, and also claims to be the oldest directory. It is similar to *Yahoo,* being searchable and browsable. Authors submit their resources which are then examined by a member of the Galaxy staff and allocated to an appropriate subject category or categories.

The advantages and disadvantages of various types of search tools are comparatively shown in Table 9.8.

Table 9.8. Search Tools : Advantages and Disadvantages

Search Tools/ Facilities	Advantages	Disadvantages
Search Engine (SE)	Comprehensive Coverage	Generally lack of explanatory information about the retrieved materials.
	Currency- Regular updation of the database with any new sites or changes in the existing pages	Often include different parts of the same resource within a set of search results.
		Restricted to materials accessible via the WWW. Usenet newsgroups or discussion list generally use a different search tool.
Meta-Search Engines (MSE)	Some MSE conduct a simultaneous search on multiple databases, thus ensuring more compre-hensive coverage of WWW	Lack of explanatory information about the materials retrieved.
	Some MSE link users to a range of SE's	Generates huge number of hits.
	Are useful where comprehen-siveness is the aim	Time taken to sift through the search results.
		Lack of discrimination between materials in terms of quality.
Subject Catalogues/ Directories (SC/D)	Provide better results than SE, because of the human interface	Not as comprehensive as SE.
	Different levels of the same resource not included in the catalogue	Not automatically updated when sites or pages change.
	Fewer results, less repetition, and more informative descriptions than SE	Do not discriminate between sites in terms of their quality.

Subject-based Gateway Service (SBGS)	Provide access to detailed descriptions of high quality resources	Cover relatively small number of materials due to high level human involvement.
	Already identified and evaluated high-quality resources, thereby helps user to avoid filtering of potential useful resources from a galore of resources	Not updated as frequently as search engines.
	Include descriptions that intend to provide an accurate, concise and meaningful indication of the value and usefulness of the material	Narrow audience focus limits its scope to a particular subject area, hence may not be as useful to someone outside the domain of that area.
	Cover the full range of Internet materials	
	Have narrow audience focus.	

9.20. SEARCHING THE INTERNET– SOME TIPS

Having learnt about various search tools and facilities, the searcher/ navigator needs to know where to start in order to economize on time and get the best. The following gives a gist of where to start for information retrieval on the Net.

- The first task when you are looking for quality is to locate a site or service which provides access to high-quality materials within the subject area of interest. Subject-based gateway services and virtual libraries would probably be an invaluable guide and perhaps the best starting place from where you can reach to the enormous number of guides. Using a gateway or virtual library as starting point can save you a lot of time and effort because you need not sift through thousands of outdated and useless sites. Facilities like *Argus Clearinghouse* can act as a great source to begin with.

- However the searcher might not be in a position to either find a guide covering the requisite subject area or even if he/she locates a guide, there may be nothing of interest in it. The second step thus should be to broaden the search.
- Still if there are no results then the searcher should move to rating and reviewing services that can be useful in indicating recommended sites, at a glance when sifting through the search results.
- If such services does not prove useful, then one should move to general subject directories or catalogues, which tend to be though larger but less selective in terms of site quality.
- If still nothing useful is found, then the next option should be the search engine. These yield comprehensive search results, though these could be less specific.
- The final option would be to opt for a meta search engine, still if nothing worthwhile is found, it may be time to presume thai no relevant item is available on the Internet on that specific query, which is, of course, very rare.

But, Web is continuous, infinite, and ever growing. Its growth rate is exponential, dynamic and multidimensional due to which, the index is also becoming comprehensive, complicated and time consuming with lot of irrelevant and dead links. Due to these problem, it has become a general assumption that, if you have time go to Internet, and do not have time to go to Library, to overcome such barrier, steps should be taken for better designing of search tools for better information organization. Uniformity in search techniques will be an asset to boost the retrieval,

Above tools were for information access in online environment but there are the digital resources which are not

put online rather they are just stored like their print surrogates in libraries, which can be searched through OPACs and Web OPACs only.

So have a look on OPACs and Web OPACs.

9.21. OPACs AND WEB OPACs

OPAC is an acronym for "Online Public Access Catalogue". It is an access tool and resource guide to the collection of a library or libraries , which provide bibliographic data in a machine-readable form and can be searched interactively on a computer terminal by a user. Some features of OPACs are:

- It is a bibliographic control system that allows access by a number of access points to the bibliographic data stored in a machine-readable form.
- It is an interactive catalogue with potential to over come the major limitations of earlier forms of catalogues.

Web OPAC is an advancement over traditional OPACs, serving as a gateway to the resources not obly held by the respective library but also to the holdings of other linked libraries without limiting to local collection but going beyond further to regional, national and international levels. Web OPAC is Internet connected to online catalogue, which can be accessed remotely. It –

- Provides direct access to a library's bibliographic database.
- Offers opportunities to have access to various resources of other libraries on the web.
- Has the ability to use hypertext links to facilitate navigation through Bibliographic records, and
- Has usual features of OPAC.

9.21.1. Generation of OPACs

OPACs can be categorized into three generations on the basis of evolutionary changes to incorporate novel features in data content, access points and user interface.

First Generation OPACs : These are referred to as "Phrase indexed or Pre-coordinate OPACs". They were derived from traditionally searchable catalogues of library cooperatives and networks. They were with limited interface facilities for public. Their features are similar to card or COM catalogues. Besides, they were library oriented system and menu driven and simple to operate. Sophisticated combinations of search could not be made. OCLC is an example,

Second Generation OPACs : They were derived from commercial bibliographic information retrieval systems of 1970s like DIALOG, BRS etc; and provides multi-access points. They are referred to as "keyword or Post-coordinate OPACs". They facilitates sophisticated search combinations using boolean logic. But needs training to understand the operators, search logic, etc. They resembles an online bibliographic IR system.

Third Generation OPACs : These possess the combined features of first and second generation OPACs. They facilitate improved subject access and facilitate ranking of retrieved output; also facilitate partial and coordination level matching. They provide access to other kinds of bibliographic information.

Generally, there are two types of web-interfaced OPACs in the library world – the traditional public catalogue converted to web-interface; and the catalogue that incorporates z39.50 protocol to the catalogue, which is a powerful communication tool based on client-server interaction search interface to the catalogue and other resources on the net.

9.21.2. Types of Searches in Web Opac Interfaces

Two types of searches have been noticed:(a) Single menu of search type; and (b) Multi menu of search type. **Single menu of search type.** Some interfaces such as Talis and INNOPAC, WebPAC 1.3 (Epixtech), OLIB, D.S.Ltd and in-house built products have only one approach to searching. They offer a single menu of search options. Searches can be simple or more complicated depending on what access point is chosen and what information regarding Boolean searching, truncation and other search features are given.

WebCat, Voyager, GeoWeb, ALEPH and WebPAC 1.2 (Epixtech) offer several search options ranging from a simple keyword or author/title to more complex or advanced search, which might involve multi-field searching where the user is presented with a screen where he/she can choose particular fields, access points and Boolean combination form.

9.21.3. Guidelines for the Design of OPAC/Web OPAC

The following guidelines would help in the design of OPACs:

Users : Who are the users of the catalogue like students, public at large, since they exhibit different needs, pattern of use and levels of skills. Should the catalogue be aimed at a specific user group or varied groups of users?

Interface : The term 'user interface' specifies how the programme and the user communicate. An effective selection criteria for the software has to be considered in consultation with the computer personnel.

Files : While files are to be incorporated in to the OPAC? Whether to include all books and journals or contents of the journals and other non-book materials.

Technology : What machine configuration will best support an OPAC. What level of computer resource will be

required? The database design should be easily changeable in accordance with the technological development.

Management : How much will it cost to develop and operate an OPAC? What are the staffing implications for both technical and public services?

Refinement : It should be possible to make refinement based on user feed back.

But the following criteria have to be considered in the design and development of OPACs.

- Terminals are to be kept in sufficient numbers;
- All resources are to be accessed;
- Response time is to be minimum;
- Subject searching be effective;
- Simple and easy to use system; and
- More access points are to be provided.

However, the development of OPACs/ Web OPACs is inhenced by limited resources, manpower, money and infrastructure facilities.

Overall, the emergence of Web OPACs in India can be characterized as a phenomenon of new millennium. Various libraries have put up their catalogues via Web in India. A few big libraries have chosen commercial softwares such as Libsys, Nirmal, AutoLib, Slim, etc. INFLIBNET has developed SOUL software for the benefit of the University and college libraries. SOUL supports MARC-21 format in its latest version. CDS/ISIS, WinISIS and SAVa/ISIS are being used in the design of OPACs.

Thus, WebOPACs are a crucial component of any library desiring an expansion of their role in the community. The 'Information Society' requires a community roadmap well

structured to provide access to information and knowledge in whatever form it occurs. WebOPAC is the right tool at this junction, but Librarians and Information Professionals are in urgent need to develops skills as to how to set up Web OPAC either using Webserver, which will allow them to provide, improved and specialized electronic library and information services to the user community.

However in online environment, the concept is becoming obsolete and new concepts as discussed in online environment earlier in this chapter, are emerging. Where library and information professionals need to participate in the web site development and be adept at using Web-based search engines, expanding the ability to search collections using disparate metadata types might be a better use of our energy. Now, Internet which is a collection of computers and servers throughout the world is becoming more prevalent. It stores and disseminates tremendous number of information. Most of the information in the world is being digitized and put on internet. Effective search for the right information is still a nightmare to the searcher. Search engines are tools on the web, which help searchers to retrieve required information from Internet. Searcher should be very prudent and particular while navigating on the web for a piece of information. But it is very necessary to select right search engine, accurate search word and appropriate search techniques to retrieve precise information within a specific time period.

10
Copyrights and Intellectual Property Rights

Scholarly publications are produced by researchers as part of their jobs. At most universities and research organizations, publication counts significantly towards salary and job security. All publications are not created equally – competition for space in top-ranked journals is intense. The demand for space in those journals is intense because they are highly visible and widely read. Publication in a top flight journal is an important measure of visibility. In some fields, citation data has become an important observable proxy for "impact."

Scholarly communication also serves as an input to academic research. It is important to know what other researchers in your area are doing so as to improve your own work and to avoid duplicating their work. Hence, scholars generally want access to a broad range of academic journals. The ability of universities to attract top-flight researchers depends on the size of the collection of the library. Threats to cancel journal subscriptions are met with cries of outrage by faculty.

Electronic publication eliminates the physical costs of

length, but not the attention costs. Brevity will still be a virtue for some readers and depth will be a virtue for others. Electronic publication allows for mass customization of articles, much like the famous "inverted triangle" in journalism– there can be a one-paragraph abstract, a one-page executive summary, a four-page overview, a 20-page article, and a 50-page appendix. User interfaces can be devised to read this "stretchtext." Some of these textual components can be targeted towards generalists in a field, some towards specialists.

Electronic publications after many advantages over traditional publishing. They offer –

Shelf-space Savings to Libraries : These publications can save the space as they do not contain physical presence, if online; or a less space if are on CD/DVDs. However, electronic archiving is not free. Running a Web server or creating a CD is costly. Even more costly is updating the media. Books that are hundreds of years old can easily be read today. Floppy disks that are 10 years old may be unreadable due to obsolete storage media or formatting. Electronic archives will need to be backed up, transported to new media and translated. All of these activities are costly. Of course, traditional libraries are also costly; the ARL estimates this cost to be on the order of $12,000 per faculty member per year. Electronic documents will undoubtedly reduce many of the traditional library costs once it is fully implemented.

Monitoring: It is much easier to monitor the use of electronic media. Since the primary point of the editorial and refereeing process is to economize on readers' attention, it should be very useful to have some feedback on whether articles are actually read. This would help make more rational decisions about journal acquisition, faculty retention, and other critical resource allocation issues.

Search: It is also much easier to search electronic media. References can be immediately displayed using hyperlinks. Both forward and reverse bibliographic searches can be done using online materials, which should greatly aid literature.

Supporting Materials: There are very small incremental costs to storing longer documents so it is easy to include data sets, images, detailed analysis, simulations, etc. that can improve scientific communication.

Further, the Internet offers much lower cost of reproduction and distribution than print, the scholarly community has excellent connectivity, and the current system of journal pricing seems to be too expensive. Each of these factors are helping push journals from paper to electronic media.

So, the scholarly publishing is undergoing a churning phase, wherein lot of factors like the open-access movement via self-archiving and open access (OA) journal publishing, open-archives initiative (OAI), open-source software, and development of cheap computing and storage costs are playing a major role in changing the whole paradigm. Helping the cause is the meteoric rise in prices of journals and consequent drop in library subscriptions. For long, scholarly content has been chained because of the stringent policies of traditional subscription-based, for-profit monopolistic publishers. Stray initiatives for OA were taken in the past but the movement has taken a strong leap ahead recently with more vocal support from the scholarly community. Though there are reservations about OA with people casting their apprehensions about the peer-review process of OA papers, impact factors, publication costs, and dissemination/access interfaces, the movement is surely gaining momentum and looks promising enough if some initial glitches are ironed out. Institutional Repositories or IRs are becoming prevalent as

the most preferred route to self-archiving. They are providing a centralized system for content capturing, organizing, storage, retrieving, disseminating, and preservating from a single interface thus acting as a scholarly content management system. One of the chief roadblocks to OA is the copyright issues of intellectual content. As most of the authors rather gift away their invaluable rights over their published research to the publishers, it becomes a very onerous task to populate the Intellectual Property Rights or IPRs.

IPRs, very broadly, are the rights granted to creators and owners for their intellectual creativity in the industrial, scientific, literary, and artistic domain. The work can be in the form of an invention, a manuscript, a suite of software, or a business name. In general, the objective of IPRs is to protect the rights of the creators/owners and at the same time allow the general public to access their creativities. IPRs maintain this balance by putting in place time-limits on the creators/owners mean of controlling a particular work. The law that regulates the creation, use and control of the protected work is popularly known as Intellectual Property (IP) Law.

IPRs are mainly statutory rights that allow the creators/owners of the products to prevent people from using the same commercially for a certain period of time. IPRs issues have today taken a global shape in the form of World Intellectual Property Organization (WIPO) and Trade-related Intellectual Property Rights (TRIPS) agreement. The principal IPRs are copyright, patents, trademarks, registered designs, geographical indicators, anti-competitive policies in contractual licenses, and trade secrets. Research and Development (R&D) involves a lot of funding and human intellectual efforts. The result of R&D like products and processes, innovations/inventions, new designs, literary and artistic work, generally turning out in financial gains to their

inventors, authors or creators, and thus are registered under one or the other heads of IPRs. The authors or creators can opt for a legal action when their IPRs are infringed.

10.1.COPYRIGHT

Copyright is unique kind of intellectual property right, the importance of which is increasing day by day, and does not fall in the area of industrial property. For enjoying copyright protection, the work must be an original creation. Copyright, was not regarded as being of much relevance to the sale of products other than traditionally artistic products such as books, music compositions, artistic works, literary works, pantomimes motion pictures, and gramophone records.

Historical saying, the legal protection of copyright dates back to the 1700s with the Statute of Anne, and at the end of the 19th century it was enshrined in the Berne Convention. Although the language of the Convention suggests a paradigm for the protection of the rights of authors and artists, in many cases copyright belongs not to individuals but to the firms that employ them. Indeed, copyright is an essential element in the business model of publishers, television and record companies, and software producers because they grant their owners exclusive rights, inter alia, over the reproduction and distribution of protected works. The new information and communication technologies (ICTs), and in particular the Internet have enable unauthorized creation of unlimited, perfect and costless copies of protected works, as well as their almost instantaneous and worldwide distribution.

Copyright remains the principle means of preventing others from copying or selling software as well as literary, dramatic, musical or artistic works. The foremost purpose of copyright law is to foster the growth of learning and culture, and the dissemination of information. It is meant to induce the creation of as many works of art, literature, music, and

works of authorship (including software) as possible. Copyright law gives authors limited property rights in their works, but only for the ultimate purpose of benefiting the public by encouraging the creation of more works. The purpose of copyright is not to protect the author, but it is to benefit the public. The balance in copyright law is drawn by limiting property rights to the author's particular method of expressing an idea. Copyright never protects the idea, but instead only protects the expression of the idea. But once the idea has been expressed in tangible form the copyright protection exists for words, literary, and musical works in which it is encompassed.

Copyright stands for the legal rights exclusively given for a definite period of time to the authors or creators of intellectual work such as a publication or an artistic or a literary work for sale or any other use. Copyright in such cases provides the authors/ creators the rights of ownership and legal protection against unlawful reproduction of such work. Besides, providing the legal protection against unlawful reproduction and use of their work, the copyright also recognizes the benefits accrued by the reproduction or usage of their creative works by others. This obviates an agreement between the authors and the publishers (or users). The time span for which the law provides the copyright protection varies in different countries depending upon their regulations. It is life time of the author and a term of 60 years after the death of the author in India, 50 years in UK and USA, and 70 years in the European Union. After the expiry of the copyright period, the work falls into the public domain and then can be used by anyone without authorisation. The salient features of copyright are:

- Protection of aesthetic creations without formalities.
- Registration not necessary.
- Protection of expression of ideas only, not the ideas

themselves.

– No concern with the quality of the work, and

– Protection to original work only.

Copyright grants certain exclusive rights to its owner. Based on these rights, the copyright owner can copy the work, issue copies of the work to the public, rent or lend the work to the public, perform, show or play the work in public, communicate the work to the public including broadcasting and electronic transmission, and can adapt of the work or do any of the above in relation to an adaptation.

Copyright is said to be infringed when one of the exclusive rights of the owner is performed by a party without the consent or authorization of the owner. This infringement is called primary infringement. Providing accessories for infringing the exclusive rights or assisting in the making or distribution of infringing rights is also treated as an infringement and is referred to as secondary infringement.

10.1.1. "Fair Use" in the Digital Era

National copyright laws in most countries incorporate exceptions for copying for personal use, research, education, archival copying, library use and news reporting, based on principles of 'fair dealing', or in the US, the doctrine of 'fair use'. The scope, strength and flexibility of these exceptions vary widely between countries and the regions, in part due to differing national jurisprudence, but generally focus on the following conditions:

- The purpose and character of the use - copying must be for private, non-commercial purposes. Only single or a small number of copies may be reproduced.
- The proportion of the work that is copied - copies should be made only of parts of the work. Complete works may

be copied only where originals are not available on the market.

- Copies of hard copy works may typically be produced only by reprographic processes. There is also some freedom to make copies of electronic works as, for example, for time-shifting of TV programs or archiving of computer software.
- If there are exemptions for the benefit of libraries and archives, those institutions must be accessible to the public and act in a non-commercial way.
- The legitimate interest of the right-holder must be taken into account - the effect on the potential market for the work.

The development and diffusion of digital technology, however, now permits unauthorized creation of unlimited, perfect and costless copies, and the almost instantaneous and worldwide distribution of protected works. The copyright industries are responding by using digital technology, in the form of encryption technologies and anti-circumvention measures, supplemented by contract law and *sui generis* forms of databases protection. Critics argue that these measures effectively restrict "fair use", and may reduce the ability of teachers, students, researchers and consumers to access information, particularly in developing countries.

The arrival of the digital era provides great opportunities for developing countries in accessing information and knowledge. The development of digital libraries and archives, Internet-based distance learning programmes, and the ability of scientists and researchers to access sophisticated on-line computer databases of technical information in real time are just some examples.

But the arrival of the digital era also poses some new and serious threats for access and dissemination of

knowledge. In particular, there is a real risk that the potential of the Internet in the developing world will be lost as rights owners use technology to prevent public access through pay-to-view systems.

10.1.2. Copyright Based Industries

Copyright-based industries such as publishing and computer software play a major part in the global knowledge-based economy, and the products and services they provide have a central role in facilitating innovation and social and economic development in general. The success of these industries is reflected by their tremendous growth, which has generated millions of high-paying jobs and billions in revenues, including in some developing countries.

The computer software industry is also a highly important source of innovation in its own right and its members argue that they have produced dramatic gains in the performance and functionality of many commercial software products in the last decade or so while prices have remained stable or even fallen.

For example, according to the Publishers Association there are around 600,000 books currently in print in UK and like the case may be for India. This is a hugely valuable knowledge resource for innovative industries and society at large. And of course, industries must be able to recoup these investments to pay for new generations of knowledge-based products. So, for example, the computer software industry argues that charging licence fees for its products allows companies to generate revenues to fund future R&D.

The prevention of unauthorized copying has always been the principal objective behind the development of international copyright rules and this remains the case. Unauthorised copying of copyrighted works which is usually described rather more pejoratively as "piracy" by copyright

holders, has a long history and remains an international phenomenon, occurring in both the developed and the developing world.

The US, for example, justified its persistent refusal to grant copyright protection to foreign authors during the 19th century on the grounds that this was a necessity to meet the nation's needs for knowledge and enlightenment. And interestingly, although industry claims that current rates of unauthorized copying are highest in some developing countries and transition economies, the biggest financial losses to rights holders still occur in developed countries, because their market size is so much bigger.

The arrival of the digital era has created the fear for the copyright-based industries that they may be able to sell "only one copy" of a new e-book, DVD movie, music CD, or computer programme before it is illegally copied, as a perfect replica at no cost, and may be distributed seamlessly worldwide through computer networks and the Internet. In the past, however, the evidence shows that weak levels of copyright enforcement have had a major impact on diffusion of knowledge and knowledge-based products in certain cases, such as computer software, throughout the developing world.

Indeed, it is arguably the case that many poor people in developing countries have only been able to access certain copyrighted works through using unauthorized copies available at a fraction of the price of the genuine original product. It is therefore concerned that an unintended impact of stronger protection and enforcement of international copyright rules as required, inter alia, by TRIPS will be simply to reduce access to knowledge products in developing countries, with damaging consequences for poor people.

Responding to this concern, representatives from the copyright-based industries point to the special initiatives they are undertaking for developing countries, such as donation

schemes and low price "budget" editions of books and computer programmes for cost-sensitive users, as the way forward rather than any weakening of international copyright rules and/or enforcement measures in the developing world. For example, the publishing industry is now supporting an expanding number of initiatives aimed at improving affordable access to books and journals in developing countries and establishing partnerships with publishers in less developed countries to encourage the development of local publishing industries.

Likewise, in the computer software industry, a leading software company is making several of its software products available to South Africa's public schools at no charge, thereby helping South African students and teachers become IT-proficient, while helping to build its future markets. But ultimately commercial companies are responsible to their shareholders. They are not charities, nor are they intended to be. Companies therefore think it is the responsibility of governments from developed countries and development agencies to meet developing countries' requirement for subsidized access to affordable copyrighted works in order to address their needs for education and transfer of knowledge. The fact that publishers are prepared to support various schemes for low or no cost access for institutions in developing countries for on-line publications indicates that they recognize there is scope for differential pricing, with suitable safeguards.

The copyright holders have a right to appropriate returns from their investments just as other industries, it is believed that from the wider public policy perspective, ultimately it is just as important to ensure that people in developing countries have better access to knowledge, as it is to ensure they have access to other essential inputs for development such as food, water and medicines.

The publishers, and software producers, have got the balance right in facilitating access in developing countries in ways that are consistent with their obligations to shareholders. Publishers, both of hard copy and on-line books and journals, and software producers should review their pricing policies to help reduce unauthorized copying and to facilitate access to their products in developing countries.

Initiatives being undertaken by publishers to expand access to their products for developing countries are valuable and an expansion of such schemes is encouraged. The extension of free on-line access initiatives for developing countries to cover all academic journals is a good example of what could be done. There has been a welcome expansion of primary and secondary education in developing countries, and aid has been concentrated rightly in these sectors. Whilst there are still major challenges in achieving "Education for All", developing countries and their donor partners are making significant progress. Access to books and reading materials at primary and secondary levels in some countries has also improved.

This is the result of increased levels of public expenditure on primary education and international book donation programmes, such as Book Aid International. And importantly, in some countries, it is also because local publishing industries, albeit often at an embryonic stage, are able to produce low cost school books and reading materials. However, access to books and learning materials is still a real problem in many developing countries.

Association for Development of Education in Africa (ADEA), a consortium of donors and developing countries, revealed that shortages of relevant, low cost books for use inside and outside school continue to undermine the provision of good quality education. But access to books and materials is important for other parts of the education system as well.

Developing countries need educated people such as doctors, nurses, lawyers, scientists, researchers, engineers, economists, teachers and accountants. Without people skilled in these professions and a system of life-long learning and education, developing countries will be less able to absorb new technologies, generate innovation, and compete in the global knowledge economy For example, even if developing countries can obtain cheap medicines they will still need trained doctors and nurses to administer them properly in order to save lives. However, in many developing countries, particularly in Sub-Saharan Africa, the tertiary education sector has sunk to levels where it may soon no longer be able to provide minimum levels of teaching and research - and this at a time of growing demand for admissions for undergraduates. With many developing countries already spending a significant proportion of GNP on education, they may be unable to find the additional resources required simply to maintain current levels of tertiary enrolments, let alone improve quality.

Clearly, copyright is not the only issue with the weak tertiary infrastructure but high prices of books and materials and limited access to Internet-based resources are still important parts of a worsening crisis. In the tertiary sector, the evidence indicates that access to books and other materials for education and research remains a critical problem in many developing countries, particularly the poorest. Most developing countries remain heavily dependent on imported textbooks and reference books, as this sector is often not commercially feasible for struggling local publishers to enter. The prices of such books are beyond the means of most students.

10.1.3. Copyright and Computer Software

There is seen a digital divide between the developed countries and the developing world. In the knowledge-based

global economy, computer technologies are an essential requirement for accessing and using information, accelerating technology transfer and boosting the growth of productivity. At the same time, computer software products are perhaps the most heavily protected of all forms of knowledge-based products.

Copyright has become an extremely important weapon in preventing piracy of computer software and preventing copying of various useful items to which art has been applied. The protection for software has traditionally been restricted to copyrights. Software can only be copyrighted as a literary work.

Copyright infringement is fairly easy to get away since it can always be claimed that the source codes, algorithms, etc. could be used for different implementations. It necessitated the need for inserting moles of special identities in the software called as "seeds" and "signatures" by the author. The intentional use of "seeds" and "signatures" in a database, when combined with the three main vehicles of legal protection, viz., copyright, trade secrets, and contract can create a powerful defence against the computer piracy.

For the Indian industry, low value-added body shopping and data processing constitute the bulk of the software exports. Handful of software companies in India seriously pursue and secure copyright protection for their software. Out of the rest, some are even unaware that they can secure their works by going in for copyrights and the balance do not seriously pursue the process. There is also one school of thought, which simply thinks that it is not worth pursuing a copyright since enforcing and suing for infringement and damages is a long, and cumbersome legal process.

Very few of the large companies in the world hold a virtual monopoly on operating systems and no one in the industry is really putting up much of a fight against the one or

two software giants who hold monopoly and minting millions. The only reason being that these one or two companies have done a phenomenal job protecting themselves and their software products by effectively using the different intellectual property protections available for computer programs including trade secrets, copyrights, and patents.

10.1.4. What is A Computer Database?

"What exactly is a computer database?" Essentially, computer database, is a collection of information stored, in hard disk drives, diskettes, tape drives, CD-ROMs, etc., so that it can be selectively searched for retrieving the desired information using a computer. Computer database could be a program used by the computer to run certain applications, like the word processor, or data entered by a person in the computer for purpose of record and reuse, or a image file, etc. With the advancement in information technology, the significance and volume of database products is on the increase. Since this is a relatively new type of property, there is a need to rapidly evolve and create new standards and legal principles to try and protect it against its misuse, theft, unauthorised copying, and use.

However, databases have long existed in manual or book form. For example, the telephone book or directory, reference books, and legal reporters which can be termed as manual databases. The computer database is essentially an information compendium like a phone book, which has been placed in a computer and is automated. When information is computerized, there are many more ways for the information to be accessed, manipulated, and used; the value of the database to users is thereby greatly enhanced. Some popular examples of computer databases include legal databases such as Lexis, Juris, Westlaw, etc., and various business and scientific databases such as those found on Dialog and Internet.

An automated database can be defined as "a body of facts, data, or other information assembled into an organized format suitable for use in a computer and comprising one or more files". The Indian statutes are yet to specifically list automated databases as a copyrightable subject matter. For the purpose of copyrights, a computer database can also be defined as a "compilation", which means data formed by the collection and assembling or pre-existing materials or of data that are selected, coordinated or arranged in such a way that the resulting work as a whole constitutes an original work of authorship. Examples of compilation include periodical, anthology and encyclopedia, or a reference work such as a directory, index, map, telephone book, guidebook, law reporter, catalogue, chart, or a racing guide.

10.1.5. Why a Database can be Hard to Legally Protect?

Under traditional concepts of literary copyright, the data contained in a compilation, and the selection of the data, may sometimes not be protected from copying. Only the coordination and arrangement of the database may be protected, and even then there must be some originality to the collection and arrangement for it to be protected. When a database is composed of facts, these facts frequently cannot be copyrighted, for otherwise the public's right to use information in the public domain would be unreasonably limited.

The basic problem in protecting a database is that the information compiled is frequently public knowledge, understandably so the user has to know how to use the database. Just facts or the data are otherwise not susceptible of ownership by the compiler of the database. For example, a person could call every lawyer or solicitor in the country and ask if they are specialized in computer law. The names and addresses of those who said yes could then be put into a database of computer lawyers. The question is, "Does the

person preparing this database own the names and addresses of these lawyers or solicitors?" Understandably this would be denied by the concerned lawyers or solicitors. Then what does the person preparing this database own? How can he prevent other from copying and selling as his own? The way the information about lawyers or solicitors is arranged in the database might involve little or no originality. Hence, this aspect of the database might not fall under the caption "copyright" and therefore cannot be sought to be protected.

Since the names and addresses of the advocates or solicitors are not susceptible to ownership, a competitor certainly could call up all of the attorneys in the country and, assuming he got the same answers, come up with the same list. This would unquestionably be fair competition, and the first person who thought of the idea of compiling a list of advocates or solicitors specializing in computer laws would not be able to stop the competitor from coming out with compilation of another list of advocates or solicitors specialising in computer law.

There are essentially three ways to legally protect computer databases – copyright, trade secret, and contract. Ideally, all three of these legal means can be employed, along with practical non-legal methods, to provide the maximum protection against the piracy of the databases. There are, of course, other legal theories propounded in the US, such as unfair competition and conversion, however, these theories may be pre-empted by copyright law. Indian copyright law provides the framework and basic foundation for legal protection by securing for limited time to the authors and inventors the exclusive rights in their respective writings and discoveries.

10.1.6. Copyright Law

Copyright protects the expression of idea and not the idea itself. Originality requires the author of the specific work to contribute something more than a "merely trivial" variation, which is recognisably "his own." The traditional copyright doctrine envisages, that a work must show some "creativity" in order to meet the originality test, and it is not subject to copyright if the work merely copies an existing work. The work should evolve from the intellect of the author and shall not be altered or edited repetition of any other existing work. This essential element of "creativity" is weak or completely absent in many manual reference works or computer databases. For example, what creativity is there in an alphabetical listing of names in a phone book?

Another basic problem in protecting a database is that copyright law does not prohibit the copying of facts, even newly discovered or expensively acquired facts, nor does it prohibit the copying of ideas. Copyright law can only provide protection to the arrangement and coordination of facts in a database. Even then, there must be some originality to the collection and arrangement for it to be protected.

Typically, the preparation of a database requires a significant expenditure of time, effort and money to cull and select information from various different sources, but little or no original creativity to express the facts, or arrange them. In these circumstances, where the compiler gathers and compiles raw facts, he did not create the facts; he just discovered or uncovered them, sometimes at great expense and trouble. Such was the case in the earlier example of the poor investigator who had to call every advocate or solicitor in the country to see if they practiced computer law. So how can one prevent copying of the work?

In order to lend copyright protection to merely factual databases, we have to look to the decisions pronounced by

American Courts. They moved away from a strict application of the creativity test, and employed the test of "industriousness" or "sweat of the brow". This was attempted in order to test and determine if the database is an "originality" from the "labour and expense" necessary to make the compilation, rather than from any real "creativity' of the author.

Under the "sweat of the brow" doctrine, copyright could prevent the unauthorized copying facts in a database, if the compiler could show that sufficient efforts went into the acquisition and selection of the data to make it original. The protection would lie even if the information compiled was public knowledge or otherwise not protected.

The decisions of the American Courts and the above doctrine have to be critically analysed in the Indian legal perspective before any reference is made or guidance taken from. If we talk about Indian copyright law, the earliest copyright statute in India is the 1847 Act, enacted during the East Indian Company's regime. Not much of information is available about how the Copyright Act operated till 1911. In 1911, Britain codified the Copyright Act of 1911 and made it applicable to India. In 1914, the Indian Copyright Act was enacted, which was a modified version of the 1911 Act. The first Act after independence is the Copyright Act of 1957, which took into consideration the new developments and technological advances and introduced number of changes and new provisions. The Act was further amended in 1983, 1984, 1994, and 1999. The amendment of 1994 brought computer programs within the ambit of the Act. The further amendment in 1999, apart from others, saw the amended definition of the literary works and meaning of copyright in respect of computer programs.

Indian copyright law more than meeting the World Trade Organisation (WTO) requirements has weak enforcement. And with other problems inherent in copyright protection of a

database, contract and trade secret law becomes all the more important to try and prevent the unauthorized copying of factual data from a database. So some more modifications are needed.

10.2. CONFLICTS OVER INTELLECTUAL PROPERTY

Intellectual property is a form of knowledge which societies have decided to be assigned as specific property rights. They have some resemblance to ownership rights over physical property or land. But knowledge is much more than intellectual property. Knowledge is embodied in people, in institutions and in new technologies in ways that have long been seen as a major engine of economic growth.

The object of Intellectual property is something intangible, although it usually has tangible expression. Intellectual property has always been closely tied to technology. Technology arises from intellectual property in the form of new inventions, but technology also supports intellectual property by providing new, more powerful and more efficient ways of creating and disseminating writing, musical composition, visual art, and so on.

In fact it was the technology of the printing press that originally gave rise to intellectual property as a legal and moral issue. Before, when it took almost as much of an effort to reproduce a document as it took to create it, there was little need to impose limits on copying. It was only when inexpensive reproductions became feasible that it was seen as necessary to give authors more control over how their works were used by creating copyrights.

Computer technology has created a new revolution in how intellectual property is created, stored, reproduced and disseminated; and with that has come new challenges to our understanding of intellectual property and how to protect it. Of course computers have given rise to a whole new category

of intellectual property, namely computer software. A major commercial program can take a team of one hundred or more highly skilled and highly paid programmers years to create and can sell for hundreds, or even hundreds of thousands, of dollars per copy.

Yet someone with access to such a program can make a copy in moments at practically no cost. There is clearly great incentive for the user to make copies without paying for them, while the creator in many cases insists on being paid for each copy in order to recoup the investment in creating the product, plus a reasonable profit. In addition, as more and more traditional forms of intellectual property, such as writing, music and other sound, movies and videos, photographs, and so on, are being made publicly available on computer networks, they can be copied, manipulated, reworked, excerpted, recombined, and distributed much more easily than before. Without some form of legal and moral protection, the creator or "owner" of such creative products has much less control over how they are used and by whom, and less opportunity to benefit from them.

The types of claims asserted over intellectual property have been many and diverse, some eminently reasonable, others seemingly quite extreme. The following cases give some idea of the diversity of such claims.

10.2.1. Plagiarism

Plagiarism according to wikipedia is, the wrongful appropriation, close imitation ... and publication of another author's language, thoughts, ideas or expressions and representation of them as one's own original work.

Educators, especially those in higher education, are seeing an increasing number of cases of plagiarism from the Internet and other electronic sources. Students will often take all or part of an article or essay that they have located online

and hand it in as their own work, with or without additions or modifications of their own. Plagiarism, of course, has been a problem for a long time, but the easy access to vast amounts of electronic information dramatically increases the possibilities, and the temptations. Not only is there more material available, but it is much easier to find and access.

Further, it can be downloaded and included in a document with a few small commands. It is not even necessary to retype it. This violates the traditional canons of academic honesty. Students are assigned essays to sharpen their research and writing skills, and so that they will develop and express their own understanding and synthesis of the material. Copying someone else's essay does none of this. Furthermore, it is almost universally accepted that when one incorporates another's work into one's own, one must clearly identify it as copied and give credit to the original author.

10.2.2. Software Piracy

David LaMacchia, an MIT student, was indicated in April, 1994 for allegedly setting up and running a computer bulletin board that allowed people on the internet to exchange copies of commercial software. The system was set up so that anyone on the internet could post a copy of a program, which was then available for downloading for free by anyone who chose to do so. The site had become quite popular. Investigators claimed that they found software worth millions of dollars on the system.

LaMacchia was accused of wire fraud and the - interstate transportation of stolen property. If convicted he could have been sent to prison and assessed fines of up to $250,000. At the time this was billed as "the largest case of computer piracy in the country". Ultimately the case was thrown out on a technicality. LaMacchia did not benefit monetarily from the arrangement and did not download any

of the software himself. Therefore his offense did not come under existing law. However, the judge commented that "if the indictment is to be believed, one might at best describe his actions as heedlessly irresponsible, and at worst as nihilistic, self-indulgent and lacking in any fundamental sense of values". This is just one instance of the widespread practice of making and using copies of commercial software such as operating systems, word processors and other office productivity tools, games, and so on, without giving any compensation to those who created, published, distributed, and sold it. Software publishers estimate that more than half of all copies of their products in use in the United States are unauthorized. It can be as high as ninety percent in some foreign countries. In the United States and most other countries, the producers of software can copyright it, meaning that they can control its distribution and use. It is illegal to make and use copies without authorization, and software publishers have won some substantial judgments against offenders, particularly large corporations.

10.2.3. Repackaging Data and Databases

A company named ProCD published a CD-ROM containing a large compilation of telephone listings. A University of Wisconsin graduate student put all the data on the CD-ROM onto his Web site and charged users to access it. The company sued, claiming it had invested $10 million in collecting the data, putting it into an easily accessible form, packaging and marketing it, while the student was cutting into their sales and making profits himself with almost no effort. ProCD won, but only on the narrow grounds that the student had violated the shrink-wrap license agreement that came with the CD-ROM.

If the student had obtained the information through a network or a third party, presumably he would not have been held liable. Traditionally databases have not been covered

by copyright unless they involved some creativity in the way the data was selected or put together. The court found that no matter how much effort the telephone company had put into compiling the listings, it was not original and therefore not protected. There has been much debate recently about whether databases and the data in them should receive more protection than currently afforded by copyright law.

The European Union, for example, issued a directive requiring that its member states pass laws giving database developers control over how their databases and data are used. The United States has proposed legislation with similar intent, both internally and for adoption by the World Intellectual Property Organization (WIPO). Individual concerns have also been asserting stronger claims to ownership of data. For example, the National Basketball Association (NBA) has sued STATS, Inc. to prevent the latter from publishing minute-by-minute scores of NBA games while they are in progress, claiming that the scores and other statistics are the NBA's property. However, the NBA won at the trial court level.

Reverse Engineering : Computer software never runs in isolation. It has to interact with hardware, with operating systems, and often with other applications. In order for it to work correctly, the developers must know in great detail how the other pieces of the system operate, and especially how they are designed to interface. Makers of hardware, operating systems, and other software generally publish specifications about how they are supposed to work and how to interface with them; but these are frequently incomplete, obscure and inaccurate.

The developers often find they must study the actual code or hardware design of the system their product must work with, in order to get the interface right. Since the original code or design, as written by the designers, is usually jealously guarded, developers who need to learn about the system must

take object code, the cryptic code that actually executes on the computer, or the actual chips in the case of hardware, and translate them back into human-readable form to divine how they really work. This is known as reverse engineering, which is often a necessity for reliable software design.

Reputable companies are very careful to extract only the specifications necessary for a correct interface and not to copy any of the original code itself. However, the practice has been challenged in a number of lawsuits, on the grounds that the company doing the reverse engineering, could use the insight gained to produce a competing program without doing the expensive design work required in the original. However, courts have allowed reverse engineering, as long as certain reasonable restrictions are observed.

10.2.4. Copying in Transmission

The Internet, like most large computer networks today, uses a so-called “store and forward” architecture. Unlike a classical analog phone system, where there is a direct connection from the sender all the way through to the receiver, a message in a store and forward system is sent from computer to computer until it finally reaches its destination.

No computer in the chain has complete knowledge of or control over the route the message will follow. It knows enough to select the next computer to send it to. For the sake of reliability, each computer keeps a copy of the message after sending it and holds the copy until it has received verification that the message has reached its destination. That way it can resend it if the earlier attempt failed. This procedure is used for all kinds of network transactions, including email, file transfers, and Web pages. Generally the copying of messages in transit is automatic and transparent.

The copy is made by the software as a routine part of the transmission procedure and deleted when the transaction

is complete. However, it is certainly possible to keep the copy, and sometimes that is done, for diagnostic purposes, as part of a system backup, or to monitor the volume, nature, or content of network traffic. For example it is routine for some companies to save copies of all emails that pass through their computers. Store and forward transmission is a well-established and universally accepted technology. However, with the growing concern over the protection of electronic intellectual property, it has begun to be questioned.

For example the online version of The Wall Street Journal is meant to be available only to those who have paid for a subscription to it. Suppose a reader with a paid subscription is reading that day's Journal over the Web, the normal means of access. In addition to the copy on the reader's computer, there have been several other copies made on other computers to facilitate transmission. Ordinarily these will come and go without the notice of anyone, although it would certainly be possible to grab them and store them for use on the intermediate computers. As another example, suppose an employee of a large company emails a photo from a magazine to a co-worker without obtaining permission from the magazine, which is known to guard its assets jealously. The company's server archives all email, so not only does the recipient have an unauthorized copy of the photo, but so does the corporation.

These cases represent a range of possibilities that test the limits of intellectual property rights for electronic data. The first two seem fairly straightforward. Few would argue that taking someone else's work and passing it off as one's own without proper attribution is justifiable. In the second case too, it seems unfair to take and use software that has cost millions of dollars to develop and is sold for hundreds of dollars per copy, without giving some reasonable compensation to the developer.

There are some who argue that all software should be free. But even among them, the most responsible voices at least, do not advocate the Robin Hood approach of taking and redistributing commercial software, but rather work to create viable alternatives in the public domain. The other three are more problematical. The Clinton administration proposed in 1996 to extend intellectual property rights over electronically stored information far beyond current copyright law. Fortunately many of the most worrisome aspects of the proposal were not accepted, either in the WIPO treaty of December, 1996 or in the new U.S. copyright law passed few years back. However, there are powerful interests behind the push to extend intellectual property rights, particularly in the entertainment and software industries, so the pressure will no doubt continue.

The Philosophy of Intellectual Property, gives two basic justifications for intellectual property rights. The first, which he calls the Lockean justification, is often called the labour theory of property. According to Locke, a person acquires property rights to something by investing labour in it. For example if someone goes out into the forest, cuts down a tree and saws it into firewood, that wood becomes his property. Even though he did not own the tree or the land it was on and did nothing to plant the tree or make it grow, by putting the work into turning the tree into something useful, the product becomes his. He can use it as he wants, whether to sell or to heat his house, and, more importantly, he can exclude others from its use. This theory works well in a commercial environment. Not only does it offer a credible justification for private property, but it also provides incentives for people to work hard and therefore create wealth. It is interesting that Locke never applied this line of reasoning to intellectual property but the extension is obvious.

The purpose of the copyright (or copyleft, as he likes to

call it) is not so that he can sell it and be compensated for his labour, since he does not believe software should be sold, but to prevent others from selling it. He claims control over the conditions of use and distribution of his code to guarantee that a company does not incorporate it into a product that they then sell for profit.

The labour theory and the personality theory give a credible justification for at least some claims to intellectual property rights. Plagiarism is wrong under both theories. Under the labour theory, the student is claiming credit for work someone else did. The analysis under the personality theory is even more important. The student was asked to produce an essay that is a personal synthesis and analysis of the subject, not just to produce for the teacher the best possible essay, where the essay is regarded as a product whose origin is of no consequence.

For the student to present someone else's work as his own is to misrepresent himself, to violate the integrity of his person. In the second case, as noted earlier, the tremendous investment of labour and capital – another form of labor put into the development of commercial software gives the developers some right to control how it is used, including the right to charge for its use if they so choose.

The fundamental problem with intellectual property as an ethical category is that it is purely individualistic. It focuses on the creator/developer of the intellectual work and what he or she is entitled to. There is truth in this, but not the whole truth. It ignores the social role of the creator and of the work itself, thus overlooking their ethically significant relationships with the rest of society. The balance is lost. If we start with the idea of property, then the issue naturally becomes ownership and control, because that is what property is about. It is necessary to step outside that framework to get a more complete view of the issues.

Natural law, which goes back at least as far as Aristotle's Nicomachean Ethics , begins by asking what is the good. For Aristotle the good of something was inherent in its nature; it was the fulfillment of its purpose. Thus an acorn exists to become a tree. That is its purpose. It finds its fulfillment, its virtue, in growing into that tree. Human beings are by nature rational and social beings. Their fulfillment, then, and their happiness come from living rationally in society. Aristotle identifies a number of particular virtues that support this, the most important of which are friendship and love.

Software can be examined, manipulated and modified like any other information. However, at an even more fundamental level, information is about communication. The Oxford English Dictionary, for example, defines information as "Communication of the knowledge of some fact or occurrence" and "knowledge or facts communicated about a particular subject, event, etc." If information is not the communication itself, it is something meant to be communicated. The nature and purpose of information is communication. That is also therefore its good, its virtue. Any adequate ethics of information must take that into account. Another essential characteristic of information is that it is dynamic and cumulative.

Because it is the product of human thought and not itself corporeal, information is constantly changing, growing, combining, and creating offshoots. An intellectual work never springs pure and original from a single human mind. There are always influences – the language, the characters, the themes, and the structure of a novel all have their predecessors.

Programmers always learn from other programmers, as anyone who has followed their intense conversations can appreciate. One of the strongest arguments for "free software" is not just that people do not have to pay for it, but that other

programmers can examine it and learn from it. Software is not really free, according to free software advocates, unless its human-readable source code is available for distribution. The purpose, or the good, of these intellectual works is to be communicated and shared. Of course ethics is about people, not databases or automobile designs. But knowing the purpose of information tells us something very important about the purpose, or the virtue, of information producers. It is not just production that matters, but communication as well. They are not fulfilling their purpose, that is, they are not virtuous, unless their work is shared in an appropriate way and the more effective the sharing, the more virtuous they are.

10.3. INTELLECTUAL PROPERTY RIGHTS (IPRs)

Intellectual property rights are the rights awarded by society to individuals or organisations principally over creative works – inventions, literary and artistic works, and symbols, names, images, and designs used in commerce. They give the creator the right to prevent others from making unauthorized use of their property for a limited period. IP is categorized as Industrial Property – functional commercial innovations, and Artistic and Literary Property – cultural creations. Current technological developments are blurring, to some extent, this distinction, and some hybrid *sui generis* systems are emerging.

Intellectual Property Rights (IPRs) play helping role in the poverty reduction. But one study argues, IP rights do little to stimulate invention in developing countries, because the necessary human and technical capacity may be absent. They are ineffective at stimulating research to benefit poor people because they will not be able to afford the products, even if developed. In assessing these opposing arguments, it is important to remember the technological disparity between developed and developing countries as a group.

Low and middle income developing countries account for about 21 percent of world GDP, but for less than 10 percent of worldwide research and development (R&D) expenditure. The OECD countries spend far more on R&D than India's total national income. Almost without exception, developing countries are net importers of technology. It is essential to consider the diversity of developing countries in respect of their social and economic circumstances and technological capabilities. Altogether more than 60 percent of the world's poor live in countries that have significant scientific and technological capabilities, and the great majority of them live in China and India. China and India, along with several other smaller developing countries, have world class capacity in a number of scientific and technological areas including, for instance, space, nuclear energy, computing, biotechnology, pharmaceuticals, software development and aviation.

By contrast, 25 percent of poor people live in Sub-Saharan Africa – excluding South Africa, mainly in countries with relatively weak technical capacity. It is estimated that in 1994 China, India and Latin America together accounted for nearly 9 percent of worldwide research expenditure, but sub-Saharan Africa accounted for only 0.5 percent and developing countries other than India and China only about 4 percent. Thus developing countries are far from homogeneous, a fact which is self-evident but often forgotten. Not only do their scientific and technical capacities vary, but also their social and economic structures, and their inequalities of income and wealth.

The determinants of poverty, and therefore the appropriate policies to address it, will vary accordingly between countries. The same applies to policies on IPRs. Policies required in countries with a relatively advanced technological capability where most poor people happen to live, for instance India or China, may well differ from those in other countries with a weak capability, such as many countries

in sub-Saharan Africa. The impact of IP policies on poor people will also vary according to socio-economic circumstances. What works in India, will not necessarily work in Brazil or Botswana or other countries.

10.3.1. TRIPS Agreement

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) emerged from the Uruguay Round of trade negotiations completed in 1994. The Final Act of these negotiations created the World Trade Organization (WTO) and set out rules - the WTO Agreements including TRIPS - with which members of the WTO have to comply. A dispute settlement system was also streamlined to resolve trade disputes between WTO Members. WTO, has 144 Members, accounting for over 90 percent of world trade. Over 30 further countries are negotiating membership.

TRIPS requires all WTO Members to provide minimum standards of protection for a wide range of IPRs including copyright, patents, trademarks, industrial designs, geographical indications, semiconductor topographies and undisclosed information. In doing so, TRIPS incorporates provisions from many existing IP international agreements such as the Paris and Berne Conventions administered by the World Intellectual Property Organisation (WIPO).

TRIPS however also introduces a number of new obligations, particularly in relation to geographical indications, patents, trade secrets, and measures governing how IP rights should be enforced. A special body, the Council for TRIPS, on which each WTO Member is represented, was established to administer the operation of the TRIPS. The TRIPS Council is responsible for reviewing various aspects of TRIPS as mandated in the agreement itself and also as requested by the biennial WTO Ministerial Conference.

Among the issues raised by TRIPS that have provoked

the most discussion are:

- The objective set out in Article 7 that IPRs whether should contribute to the transfer of technology is achievable, particularly in respect of developing country members of the WTO.
- The perceived tensions between Article 8 which allows countries to adopt measures necessary to protect public health, and to prevent abuses of IP rights, provided they are TRIPS consistent, and other requirements in the agreement. These include the requirements to provide patent protection for pharmaceutical products, limitations on the conditions for issuing of compulsory licences (Article 31) and on the scope of provisions providing exceptions to patent rights (Article 30).
- The requirement to protect test data against "unfair commercial use" in Article 39.
- The justification for providing additional protection for geographical indications for wines and spirits (Article 23), and whether this additional protection should also be extended to cover other or all geographical indications.
- The extent to which patents should be allowed on inventions relating to living forms, for example microorganisms (Article 27.3(b)), and the requirement to provide IP protection for plants. In that context, the compatibility of TRIPS with agreements such as the Convention on Biological Diversity (CBD) has been raised.
- The cost of meeting the requirements of TRIPS for many developing and least developed WTO Members in relation to the administration of IP rights and their effective enforcement.

WTO Members considered as developed countries were given one year to comply whilst developing countries and transition economies were given until 1 January 2000 although for developing countries required to extend product patent protection to new areas such as Pharmaceuticals, a further five years was provided before such protection had to be introduced. Least Developed Countries (LDCs) were expected to enact TRIPS by 2006 although the Doha Ministerial Declaration on the TRIPS Agreement and Public Health allowed them a further 10 years in respect of pharmaceutical products. Where there are disputes over the interpretation of TRIPS and its implementation by national laws, members may bring cases to the WTO's Disputes Settlement Body (DSB) to resolve.

The proliferation of IPRs, particularly in areas such as biomedical research, has suggested the possibility of a different tragedy, an "anticommons" in which people underuse scarce resources because too many owners can block each other... more intellectual property rights may lead paradoxically to fewer useful products for improving human health". Companies may now incur considerable costs, in time and money, determining how to do research without infringing other companies' patent rights, or defending their own patent rights against other companies.

In the US, the term of copyright has extended in the last century from 28 years (renewable for a further 28 years) under the 1909 Copyright Act to 70 years after the death of the author, or 95 years from publication in line with European practice. In 1998, Congress passed the Digital Millennium Copyright Act (DMCA) which, inter alia, forbids the circumvention of technological protection. In Europe, the Database Directive requires all Member States to provide *sui generis* protection for any collection of data arranged in a systematic way, whether the data itself is original or not. So

far the US has not followed this approach.

Increasingly there is concern that protection, under the influence of commercial pressures insufficiently circumscribed by considerations of public interest, is being extended more for the purpose of protecting the value of investments than to stimulate invention or creation. Most developed countries have sophisticated systems of competition regulation to ensure that abuses of any monopoly rights cannot unduly affect the public interest. In the US and the EU, for example, these regimes are particularly strong and well-established. In most developing countries this is far from being case. This makes such countries particularly vulnerable to inappropriate intellectual property systems. It is considered that developing countries can seek to learn from the experience of developed countries in devising their own intellectual property systems suitable to their particular legal system and economic situation. Apart from the impact of local intellectual property rules internally in a developing country, there are also indirect impacts of the developed country intellectual property system on developing countries.

In the digital age, restrictions on access to materials and data on the Internet affect everyone. Scientists in developing countries, for instance, may be prevented from gaining access to protected data, or have insufficient resources to do so. Research on important diseases or new crops affecting developing countries, but carried out in developed countries, may be hampered or promoted by the intellectual property system.

The intellectual property regime in developed countries may provide powerful incentives to do research of particular kinds which mainly benefit people in developed countries, diverting intellectual resources from work on problems of global significance. Practice in developed countries may allow knowledge or genetic resources originating in developing

countries to be patented without prior arrangements for sharing any benefits from commercialization. In some cases developing country exports to developed countries may be restricted as a result of such protection. Equally important for developing countries is the continuing trend towards the global harmonisation of intellectual property protection. The movement towards harmonisation is not new - it has been going on for over 100 years.

However the TRIPS agreement, that entered into force, subject to specified transitional periods, in 1995 has made minimum standards of intellectual property protection mandatory for WTO members. But TRIPS is only one element of international harmonisation. There are continuing discussions in WIPO aimed at further harmonisation of the patent system, which may supersede TRIPS.

Moreover, bilateral or regional trade and investment agreements between developed and developing countries often include mutual commitments to implement intellectual property regimes that go beyond TRIPS minimum standards. Thus there is sustained pressure on developing countries to increase the levels of intellectual property protection in their own regimes, based on standards in developed countries. The impact of IPRs is very often contingent on particular circumstances and context. Many academic observers, for this reason, remain determinedly ambivalent as to whether the social benefits of IPRs exceed their costs. In the case of developing countries, several recent reports by international agencies have commented on the likely impact of the globalization of intellectual property protection on developing countries.

The TRIPS agreement treats them in the former sense, while recognizing the need to strike a balance between the rights of inventors and creators to protection, and the rights of users of technology (Article 7 of TRIPS). The Universal

Declaration of Human Rights has a broader definition recognizing "the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author", balanced by "the right...to share in scientific advancement and its benefits". The crucial issue is to reconcile the public interest in accessing new knowledge and the products of new knowledge, with the public interest in stimulating invention and creation which produces the new knowledge and products on which material and cultural progress may depend. The difficulty is that the intellectual property system seeks to achieve this reconciliation by conferring a private right, and private material benefits.

Thus the (human) right to the protection of "moral and material interests" of "authors" is inextricably bound up with the right to the private material benefits which result from such protection. And the private benefit to the creator or inventor is derived at the expense of the consumer. Particularly where the consumer is poor, this may conflict with basic human rights, for example, the right to life. And the intellectual property system, as manifested in TRIPS, does not allow - except in rather narrow ways -discrimination between goods essential to life or education, and other goods such as films or fast food.

In particular, there are no circumstances in which the most fundamental human rights should be subordinated to the requirements of intellectual property protection. Intellectual property rights are granted by states for limited times whereas human rights are inalienable and universal. For the most part intellectual property rights are nowadays generally treated as economic and commercial rights, as is the case in TRIPS, and are more often held by companies rather than individual inventors. But describing them as "rights" should not be allowed to conceal the very real dilemmas raised by their application in developing countries,

where the extra costs they impose may be at the expense of the essential prerequisites of life for poor people. Regardless of the term used for them, we prefer to regard IPRs as instruments of public policy which confer economic privileges on individuals or institutions solely for the purposes of contributing to the greater public good.

There is a tendency among some to treat more intellectual property protection as self-evidently a good thing. More taxation might be desirable if it delivers public services that society values more than the direct and indirect cost of taxation. But less can also be beneficial, for instance if excessive taxation is harming economic growth. Moreover, economists and politicians spend much time considering whether the structure of the tax system is optimal. The immediate impact of intellectual property protection is to benefit financially those who have knowledge and inventive power, and to increase the costs of access to those without. This is obviously relevant to the distribution of gains between developed and developing societies. Even if there were economic gains to the world as a whole from extending protection, on which there is some debate, the distributional consequences for income may not accord with our sense of equity.

In the majority of developing countries, with weak scientific and technical infrastructures, the benefits in the form of the stimulus to domestic innovation will be muted, but they will still face the costs arising from the protection of technologies. Thus the costs and the benefits of the system as a whole may not be fairly distributed. If most developing countries do not have a strong technological base which could benefit from intellectual property protection, they do have genetic resources and traditional knowledge, which have value both to them and to the world at large.

These are not necessarily intellectual property

resources in the sense that they are understood in developed countries, but they are certainly resources on the basis of which protected intellectual property can be, and has been, created. This raises a number of difficult issues as to whether and how these resources should interact with, and be valued by, the "modern" intellectual property system, the extent to which these resources and knowledge require their own protection, and how commercial benefits derived from these resources should be equitably shared. The Internet also offers enormous opportunities for access to information required by developing countries, in particular scientists and researchers, whose access to printed media may be limited by lack of resources.

But there is a concern that forms of encryption or "digital rights management", designed to counter widespread copying, will make material less accessible than is now the case with printed media. Such trends endanger the concept of "fair use" as it applies now to printed works, and at the extreme may provide the equivalent of perpetual copyright protection, by technological rather than legal means.

10.3.2. Setting Standards And Self-protection

Digital Rights Management or DRM is one part of the Secure Digital Music Initiatives or SDMI, that has developed into a viable system for intellectual property (IP) protection and enforcement. The music industry's prayer for a programme that could stem the tide of unauthorized file sharing has been answered in the form of DRM. Indirectly, DRM is also protecting the IPR of the owners, thereby proving itself an important facilitating mechanism for protecting copyrights in free market. Like specified IP protections such as copyright, DRM also can protect several other kinds of rights like the right to privacy, a fundamental right in many legal systems, which can directly or indirectly affect the distribution of the information, the product or even in remote,

the services too. It is predicted that the current approaches to IP protection and enforcement through DRM may render the present legal protection available in form of copyright archaic.

10.3.2.1. Components of Digital Rights Management

The following are some of the broad components and important areas of DRM :

- Business objective and privacy
- Planning the product, identifying the rights and related documents.
- Basis of use of such rights.
- Management of legal and other rights.
- Tools of DRM – legal and technical.

Objective and Privacy : Every entity starts with an objective. The objective, being the vision of the company, obviously has an aura of secrecy or privacy around it. The entity could be an individual, a partnership, a private limited company, a trust or a society. It is still not clear as to how DRM could step in at this very nascent stage, though there are ideas visualised and visions set, there is not enough work done or information or strategy developed to segregate, decide, and crystallise the probable course of action, be it manufacturing, programming, developing a prototype, etc. It could simply be stated that this nascent stage is the drawing board stage. In such a scenario, it is to be seen whether a technique like DRM can be implemented or even protection tools like nondisclosure, trade secrecy agreements are simple enough to give the adequate protection at this stage.

Planning the Product, Identifying the Rights and Related Documents : It has been the experience of various organisations, which have implemented the DRM package

either in its simple format or complex procedures, that initial identification of work or product, the recordings of the works, the concerned and right owners, their rights and the works and also their consent to exploit the work is a bit difficult. Let us take one aspect, identification of material and document of a literary work. The products in general in literary work are books, compilations of information, electronic database, computer scripts or programs, articles, etc. Having done this the next step would be to identify the work and who created the said work. This can be done in various ways like enquiring about the owners' rights, checking for copyright notices, and also a search of relevant industry catalogues.

It is a general rule that a creator or producer of material holds the copyright unless there is an agreement to the contrary. Authors could be writers, music composers or even software developers. Once the identification of the author is done, then the moral and performers right should be taken into account. In the maze of technology development the system should not forget to respect the moral and performers rights. This can be achieved by detailing all the information about the performer, the work done by him, etc.

Basis of Use of Such Rights : A right is based on the consent of such right holder. If a copyright user is not exercising his exclusive right himself, then he can give permission through licenses to other people to do so. Such licenses could be subject to certain payment conditions like outright sale or royalty or license fee, etc. In a digital environment the copyright owner may expressly or impliedly license the work to some other. It is to be remembered that almost all common DRM platforms or systems digitally reproduce the content and transmit them to the end users. However, in such transmission there is one practical problem that arises. In the multiple reproduction of such content in various servers, the transmission and retransmission from one server to another, a temporary memory is created till

such content reaches the end user. The matter of concern could be such temporary copy created as a part of the technical process. Whether this infringes copyright or not depends upon whether the original transmission is authorized. Also, under the Copyright Act the temporary material, which is a part of the technical process of transmission, do not infringe the copyright provided the original transmission is authorised. It also means that if a particular work is being transmitted on the Internet, rights need not be obtained to make temporary copies.

Management of Legal and Other Rights : The most common rights that could accrue to the author are copyrights, trade secrets, and patents. Rights management is a very crucial stage in the entire process. Normally, it can be on two levels, organizational and the product level. The management of rights can be successfully achieved only when a management plan is put in its place. At the organizational level, rights management could include setting up of rights management policies, refining such policies, drafting and managing of agreements, managing the information on rights acquired, which would also include knowing from whose the rights were received, how broad such rights are so on and so forth, control and enforcement of licenses, supporting licenses, and also the revenue collection. Management of rights would also include valuating of rights where under factors like creating costs, time taken to produce, are also considered. One more aspect is the mode of securing such rights where under acquiring variety of consents and authorizations need to be done. The development of appropriate agreements is also a very vital part of the management. Agreements portray the extent of rights that can be acquired or bargained. These agreements could be assignment agreements, which involves transfer of ownership for consideration or licenses, which may include nonexclusive licenses, etc. Similarly, at the product level things to be

attended, acquiring adequate information on the product information on policies and agreements, enforcement of such rights, and also revenue collection support are also important.

10.3.2.2. Tools of Digital Rights Management

DRM also incorporates and envisages technical and legal tools that are vital. These tools are:

Technical Tools : DRM can be performed by several different kinds of tools like a right definition language. Though it is demanding to define a particular language, however, extensible rights markup language (eXRML), and open digital rights language (ODRI) may define DRM. There are also the communication protocols that need to be developed to maintain the homogeneity of understanding the transferring of data.

Legal Tools : Legal tools constitute the copyrights, patents, trade marks, the various law enforcement authorities, modes of settlements of disputes like arbitration, court rulings, etc. In the matters of evidence, technical tools may be needed to show and prove evidence. For this purpose legal tools may have to heavily depend on technical tools. Thus, it can be concluded that in the matter of legal proceedings and establishment of evidence, it is imperative that legal as well as technical tools are deployed and worked in consonance.

Some of the major entertainment companies are using DRM or copy protection, to confine the digital media. These DRM technologies do nothing to stop copyright pirates, but instead end up interfering with fans' lawful use of music, movies, and other copyrighted works. DRM can prevent one from making backups of the DVDs and music downloaded from online stores, recording favourite TV programmes, using the portable media player, remixing clips of movies, and much more. At present, DRM has been introduced as the Digital Millennium Copyright Act (DMCA). Circumventing DRM locks

or create the tools to do so, even to enable non-infringing fair uses, may lend to the receiving end of a lawsuit. The DMCA has been a disaster for innovation, free speech, fair use, and competition. Further, the US Congress is now considering new laws that go beyond the DMCA, mandating DRM in a wide array of digital media, devices and personal computers, giving entertainment industry lawyers, and federal bureaucrats veto power over new gadgets.

So, DRM is becoming increasingly an important area with its focus on management of digital products. Today, the situation is that many companies are developing their own DRM systems, be it small or large. There are companies and entrepreneurs who have developed DRM packages and products on a commercial platform. Sometimes such companies are also designing and developing tailor made DRM packages in accordance with the specific needs. Though a standard language and a homogeneous protocol network are yet to be fully developed, efforts are being made to speed up the process. It would be only a matter of time before such standardisation is implemented at a commercial level.

Another security tool is digital watermarking. It is briefly discussed below :

10.3.3. Digital Water Marking

A Digital Water Marking (DWM) is a form of steganography in which copyright and other source information is hidden inside a document, image or sound file without the user's knowledge, but copies will retain the information. It can prove authorship and track copies to the original owner. It is a digital signal or a pattern hidden directly in digital content. The digital content known as host data or cover could be any multimedia product such as still images, audio data, video clip, or text document. Watermark can be any useful information to prove the authenticity of the owner.

The host and watermark are never separated so that the embedding watermark is the key point in this DWM. Once embedded, the watermark is invisible in the host. The original content is called the cover or the host and embedded message is known as watermark and the resulting cover after watermarking is called watermarked cover.

The water marking of the document involves the transformation of the original into another form. It is contrasted with public-key encryption, which also transform original files into another form. It is a common practice now-a-days to encrypt digital documents so that they become un-viewable without the decryption. Copyright infringements of digital audio, images, videos, and 3-D models can be detected by means of DWMs. They are invisible signatures that are embedded in a document in such a way that they are resistant to unintentional or malicious modifications of document – only the copyright holder owns the key that permits the decoding and/or removal of the watermark. Therefore the watermarking is a process that embeds data into an object.

Digital watermarks are one of the various strategies which should help to make the distribution of digital material more secure. A distinction can be made between active and passive strategies:

– Active methods, such as cryptography, directly prevent unauthorized distribution of data; and

– Passive methods, such as digital watermarks, serve more as a method to provide proof of ownership rights.

Unauthorized taping, reading, manipulating, or removing of data might lead to financial loss or legal problems for producers and creators. Thus, designers, producers, and publishers of digital data such as images, videos, audio sources, or multimedia material – for example, games or virtual environments need technical solutions to deal with the

problems associated with copyright protection of their data. They require systems in which digital data can be easily signed by authors/ producers to ensure and prove ownership rights on the produced audio-visual material after it has been publicly released. DWM embeds secure invisible or inaudible labels in multimedia data – such as images, audio, text, video, 3-D graphics for identifying copyright-related information such as origin, ownership, use-control, integrity, or destinations. The DWM is integrated with the multimedia and tightly bound with the quality of the content. The benefits of DWM for content protection is twofold, viz., it provides evidence of illicit copying after the event and discourages such misuse in advance.

DWM technology builds on the idea of hiding meta-information-like an owner's signature-in physical material in which content is represented, such as the pixels of an image. This concept resembles watermarks in paper. In the digital form, one can extract the embedded information when necessary to show proof of ownership. It is a multidisciplinary field that combines media and signal processing with cryptography, communication theory, coding theory, signal compression and the theory of human perception.

Interest in this field has recently increased because of the wide spectrum of applications it addresses, such as in the Digital Versatile Disc (DVD) scenario or in the Secure Digital Music Initiative (SDMI) for copy control. An application-based methodology, can generally distinguish among the following classes:

Authentication or Copyright Watermark: Watermarks the data with the owner's or producer's identification. This is the enabling technology to prove ownership on copyrighted material, to monitor the use of the copyrighted multimedia data and to analyze where the data is in use over networks and servers.

Fingerprint Watermark: Watermarks the data with customer identifications to track legal or illegal copies and detect the originator of illegally made copies.

Copy Control or Broadcast Watermark: It ensures copyrights with customer rights protocols such as copy or receipt control.

Annotation Watermark : It annotates the media data. This kind of watermark can be used to embed descriptions of the value, content of the data or dates.

Integrity Watermark: It ensures the data's integrity and recognizes manipulation. The advantage of all these methods is that relevant copyright information becomes part of the audio-visual object.

The concept of DWM consists of inserting information into the host signal under the condition that the modifications are not perceptible. In addition, it is desirable to put maximum energy into the watermark to achieve high robustness. This is a well known concept from communication theory – to decrease the error rate, the signal energy must be maximized. In mathematical formulation, the watermark embedding process can be considered as a constrained maximisation problem – maximize the watermark energy under the visibility constraint. Although the problem is straightforward to formulate, it is extremely difficult to implement because of the visibility constraint, which is usually based on a highly nonlinear model of the human visual system.

Watermark embedding can be performed in a variety of ways. There are two main groups of watermark embedding technologies: coefficient-based and system-based. *Coefficient-based* approaches are the most obvious approaches since the embedding process is performed by a direct modification of pixel values or transform coefficient values. Examples of this group are approaches based on pixel

modifications in the spatial domain, such as least significant bit watermarking where the least significant bit of the pixel values are replaced by the binary watermark values. The second group *system-based,* is less obvious to understand because the watermark embedding process is performed by slightly changing an existing processing system. Example of this group is fractal image watermarking.

Watermarks were first used in Europe to identify the guild that manufactured paper. They were like trademarks or signatures and invisible. A watermark image becomes visible as darker and lighter areas when the paper is held up to the light. Digital watermarks for photographs work differently than those used for paper. With images widely available on the internet, it is desirable to use watermarks. A watermark is a secondary image which is overlaid on the primary images and provides a means of protecting the image. There are two types of watermarks, viz., visible and invisible watermarks.

A *visible watermark* is a visible transcription image which is overlaid on the primary image. Perhaps consisting of the logo or seal of the organization which holds the right to the primary image, it allows the primary image to be viewed, but still marks it clearly, as a property of the owning organization. It is important to overlay the watermark in a way which makes it difficult to remove, if the goal of indicating property rights is to be achieved. An *invisible watermark* is an overlaid image which cannot be seen, but which can be deducted algorithmically. They are hidden in the image and can survive image cropping and file format changes. They are almost indestructible. However, with the reader, one can display them and who created the photograph and how to get in touch with them. This is like free advertising. If someone sees your image and wants to contact you about reusing it, they can easily do so.

10.3.3.1. Advantages of Digital Watermarking

A number of application areas, with different requirements and limitations, have been envisioned for data hiding. These include (i) Copyright protection and finger printing; (ii) Authentication for data integrity check; (iii) Covert communication; and (iv) Labelling and annotations.

In a practical application, the watermarking techniques can also trace the illegal users (forensic watermarks) so that the owner can approach the regulating authority. In fingerprint watermarking the buyer and seller information with date stamp can regulate copyright infringement. Hence, without an effective means for monitoring, tracking, and deterring the unlawful distribution of content once it reaches consumers, the bright expectation of content providers could not be achieved.

10.3.3.2. Disadvantages of Digital Watermarking

But watermarking has some disadvantages also. It relies on a secret key, which serves as a carrier modulated to transport a message and embed it in the original content. The drawback is that knowing the secret key implies the ability of modifying or removing the watermark–which makes a public watermarking scheme infeasible for the near future. This means that major developments in copyright technology will be oriented toward the rights of the individual, but exclude the information demands of the general public.

However, DWM is an exciting for researchers because it is a new field and there is an opportunity to do pioneering work. It exists for entertainment companies, museums and libraries because it offers the promise of better protecting their multimedia content from piracy. The possibilities for digital watermarks in the fields of geo-imaging and e-commerce are only just being realized. Watermarking can support a broad range of imaging data types whilst supporting industry

standards security implementations. It is transparent in use, does not increase files sizes, and yet is highly robust, secure and customizable. The technology has unique ability to safeguard, both digital and printed work, and secures the complete workflow with minimal impact on existing processes. A deeper understanding of the theory behind DWM will lead to the design of more robust and reliable systems for a variety of applications.

In addition, there are some other things which can be included under intellectual property rights. There are.

10.4. PATENT

A patent is an exclusive right awarded to an inventor to prevent others from making, selling, distributing, importing or using their invention, without licence or authorization, for a fixed period of time. In return, society requires that the patent applicant disclose the invention in a manner that enables others to put it into practice. This increases the body of knowledge available for further research. As well as sufficient disclosure of the invention, there are three requirements that determine the patentability of an invention: novelty, non-obviousness, and utility or industrial applicability.

10.5. TRADEMARKS

Trademarks provide exclusive rights to use distinctive signs, such as symbols, colours, letters, shapes or names to identify the producer of a product, and protect its associated reputation. In order to be eligible for protection a mark must be distinctive of the proprietor so as to identify the proprietor's goods or services. The main purpose of a trademark is to prevent customers from being misled or deceived. The period of protection varies, but a trademark can be renewed indefinitely. In addition many countries provide protection against unfair competition, sometimes by way of preventing

misrepresentations as to trade origin regardless of registration of the trademark.

10.6. TRADE SECRETS

Trade secrets consist of commercially valuable information about production methods, business plans, clientele, software etc. They are protected as long as they remain secret by laws which prevent acquisition by commercially unfair means and unauthorized disclosure.

Secrecy, in the software industry is judged in light of the industry's level of general knowledge, the information's ascertainability, and the offensive of the missappropriator's conduct. Secrecy can be destroyed by insufficient precautions, by the marketing of a product that reveals the secret, or by disclosure in judicial proceedings or to government agencies.

Trade secretes had long been the favourite protection by the software industry. They extend to virtually any concrete information, including formulas, data compilations, programs, devices, processes, and customer lists. The information should derive independent economic value, actual or potential, not being generally known to and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use; and is the subject of effort that reasonably warrants under the circumstances to maintain its secrecy.

Thus, trade secret can protect software against the unauthorized use or disclosure by anyone who obtains it through improper means or through a confidential relationship. Secrecy can be divided into two parts: (i) prevention of disclosure to external competitors, and (ii) imposition of confidentiality on one's employees. Most of the software are protected atleast to some extent by trade secrets. Adding trade secrecy protection to a database can provide

significantly greater legal rights. Unfortunately the Indian legal system has not seen much development in this sphere of law. Much needs to be done by the Government and the Judiciary in this field of law.

Trade secret protection is a viable and useful tool in protecting software because it is immediate protection and can be perpetual. Indian software companies should use this protection to keep their former employees from stealing the work product that rightfully belongs to the company. Additionally, trade secret protection can protect the company again stealing of part/s of the code in violation of an express agreement.

Since a computer database is a compilation, which derives economic value, it is a type of intellectual property, which requires trade secrecy protection. The common legal devise for implementing the principle of trade secret is the non-disclosure and secrecy agreement. It is a common practice with the Indian companies to take a declaration or enter into a nondisclosure and secrecy agreement with its employees. Once having signed this the employee is obliged to keep as a secret the knowledge gained from his former employment in any future employment more so with a competitor.

10.7. OPEN ACCESS AND IPRs

In addition to above open access journals and institutional repositories have also been emerging as another type of resources in world wide web era. These also need some kind of authentication from IPR world.

Open access (OA) has emerged as a cost-effective way to disseminate and use information. It is being widely accepted as an alternative to the traditional subscription-based publishing model. The Budapest Open Access Initiative (BOAI) defines OA as freely availability of the articles on

internet permitting any users to read, download, copy, distribute, print, search or link to the full-texts of these articles, crawl them for indexing, pass them as data to software or use them for any other lawful purpose, without financial legal or technical barriers other than those inseparable from gaining access to the Internet itself.

OA refers to a work that is created with no expectation of direct monetary return and made available at no cost to the readers on Internet for purposes of education and research. OA does not apply to materials for which the authors expect to generate revenue. The authors retain copyright for their articles with right to disseminate these to anyone. OA is intended to be free for readers, but not free for the producers. It focuses on academic research, and is concerned with scientific and research texts that scholars give to the community without expectation of direct monetary return, including peer-reviewed journal articles, pre-prints, preliminary findings, and data sets.

Establishing OA as a worthwhile procedure ideally requires the active commitment of each and every individual producer of scientific knowledge, and holder of cultural heritage. OA contributions include original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials, and scholarly multimedia material. OA contributions must satisfy two conditions:

(i) The author(s) and right holder(s) of such contributions grant(s) to all users a free, irrevocable, worldwide right of access and a license to copy, use, distribute, transmit and display the work publicly, and to make and distribute derivative work in any digital medium for any responsible purpose, subject to proper attribution of authorship – community standards will continue to provide the mechanism for enforcement of proper

attribution and responsible use of the published work, as they do now; as well as the right to make small numbers of printed copies for their personal use.

(ii) A complete version of the work and all supplemental material, including a copy of the permission as stated above in an appropriate standard electronic format is deposited in at least one online repository using suitable technical standards – such as the OA definitions, that is supported and maintained by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable OA, unrestricted distribution, inter operability, and long-term archiving.

So in short, OA can be achieved when rights holders decide to give some of their rights away to the end-user. Because copyright law is regulatory, rights holders are entitled to decide whether to decide some of their rights. The full merit of the strict reading of the definition of an OA contribution according to the Berlin Declaration is that it makes clear that initiatives by (groups of) private authors are required to advance a public goal.

Where as **Institutional Repositories** or IRs are the web-based databases of scholarly material, which is institutionally defined; cumulative and perpetual (a collection of records); open and interoperable (e.g., using OAI-compliant software); and thus collects, stores and disseminates scholarly communication.

IRs may contain pre-prints/post-prints of research articles, research reports, conference papers, teaching materials, project reports, doctoral theses and dissertations, datasets resulting from research projects, committee papers, computer software, and works of art, photographs, audio/ video recordings, patents, standards, and the like. It may

cover content of which copyright is owned by the workforce or institution, or for which permission has been obtained from the publisher to include a copy of the content in the repository. Thus, an IR should not contain content for which suitable copyright or licensing arrangements have not been made. The content of the IR is institutionally bounded, scholarly in nature, cumulative in growth and perpetual in access.

10.7.1. Copyright and Content Licensing for OA and IR

The major concerns, while depositing content in OA and IR, are the copyright and the licensing issue. The authors and the IR are concerned that whether or these methods it may be difficult to know whether or not a competitor has "cheated," and simply copied your information, or has come up with the same information on his own.

The solution to this problem is the deliberate placement of errors or omissions in your database. If your competitor's database contains the same errors or omissions, then you have pretty good evidence that your database was copied. The odds are astronomical against a second database happening to come up with the same errors and omissions as the first. Although a clever "pirate" might detect and eliminate or correct some seeds in a salted database, if the database is large enough and the original compiler/ salter author is clever enough, it is unlikely that a pirate will ever catch them all. These seeds will provide the best evidence of copying. They will bloom at the time the pirate is sued and this evidence is placed before the Judge deciding the case.

Even if the authors do not deliberately salt their database, errors will occur naturally anyway if the database is large enough. So in addition to deliberately adding some harmless errors, when and if accidental errors are discovered, they should also be carefully documented or recorded. When subsequent revised additions of the database are made, not

all errors should be corrected. There should always be subtle and harmless errors that are well documented in order to have the seeds necessary to protect a database.

In computer databases, however, there is an additional element, "signature", which can be used to prove copying. Signature pertains to the computer code or programming itself used to record the information and the program which manipulates the information. The signatures can be identified by the author as they depict his style of programming. This can be comparable to the style of writing. A programmer has also the opportunity to deliberately implant hidden but recognizable signatures in his work. These deliberate idiosyncrasies can be documented and can again provide excellent proof that there has been a wholesale copying of the program data.

Some database products consist only of the database itself and the user displays this database on his program. For instance, the names and addresses of computer lawyers could be typed in a MSWord file. The purchasers of a database would thus have to use their own MSWord program in order to view the information. In other types of database programs, the information is sold along with a program, which allows you to view and manipulate the data. In this case it is a "standalone" program which does not require another program to view it. Therefore, instead of having to load a lost of the lawyers' names and addresses into MSWord, under such a standalone program simply running the program would display the names and addresses by itself. When the database program is a standalone type with its own display and manipulation capabilities, then there are far more opportunities to place signatures in the programming itself. Further, the copy protection strategy that is applicable to all types of software can be applied.

Standard non-copying protection can also be imposed

upon the program itself. This makes it difficult for most users to ever make a copy of the program. Still, as every computer buff knows, for every good copy protection scheme there is another good "unprotection" scheme. In other words, a skilled programmer can find a way around such practical copy protection schemes. The ability of one programmer to rise to the technical competence of another, and frustrate such practical protection schemes, makes legal protection all the more important.

So, protection is important and should almost always be pursued, in any license of a computer database of significant value, copyright protection alone should not be relied upon to prohibit unauthorized copying. Trade secrecy protection and an express written agreement between the vendor and consumer are necessary to try and protect the database. If, as expected, information continues to grow in value and importance as a commodity in our society, the proliferation of licence and secrecy agreements is likely to take place. To make or buy technology, the country needs a strong system of IPR protection, be it copyrights, patents or trademarks. If we need to stand on par with the developed nations in the world market for knowledge, we need to protect ourselves and this is the only way of converting knowledge into wealth.

Besides the protection of databases can also be done by contact between seller – the creator, and the purchaser. A seller of the database can ask any purchaser to enter into a written contract as a condition of purchase of the database. Similarly, surveyor of the computer lawyer database could refuse to sell this information to anyone unless they first sign a written contract. That written agreement could expressly provide that the purchaser will not disclose the list of computer lawyers to anyone but authorized users, nor make any copies or unauthorized use of the information. Typically this takes

the form of a License Agreement between the preparer/licensor of the database and the user/license of the database.

A License Agreement is unlike a typical purchase and sale agreement in that the ownership of the product involved, the program, remains in the licensor. The licensee merely purchases the right to use the program. The licensee's right to use the program can be limited in any number of ways. The most important limitations typically are that licensee can only use the program on one or a select number of computers, the licensee may not make any copies of the program, and the licensee has to keep confidential certain information about the program or the database.

10.8. ETHICS OF ENCYPTION AND INSCRIPTION

The encryption systems have been praised as an essential component in human self-determination, At the same time, encryption is seen as a way of making the information-poor have to "pay before they play"–a system of denial of access to specific information that is essential to human development. There is a rhetorical dimension to arguments about "ethics" as they apply to such technological options as encryption, which is not conducive to the analysis of the phenomenon.

The ethics of information is not necessarily more important than other ethical issues, but information does pose distinct ethical concerns that can be considered separately. Information may be owned, but in a way that is distinct from material property ownership. It may be withheld from or, conversely, forced upon, citizens in ways that are distinct from other forms of property.

There may be a right to know–particularly information about oneself (privacy issues), but perhaps more widely about what your government is doing (Freedom of Information aspects) and to have access to information that can help in

human development ("essential" information). The freedom of expression is generally held to be a human right. The new technologies allow more operations, and focus on these operations rather than the technology. In considering the ethical aspects of encryption, it does not matter what the technology is.

Encryption has always seemed like a good idea to different people at different times but nobody knows the chaos a good idea can cause. With encryption you often have the same people finding themselves having to argue in opposite directions depending on the context. Business and citizens must make do with weaker versions and nobody is allowed to export the strong brew. Among the hard liners, there are contending views about key escrow/key recovery encryptions, with one group arguing that key escrow is the best way to regulate access, and the other group maintaining that critical infrastructures are rendered more vulnerable to attack with an architecture that allows third parties, however, trusted, to have access to encoded communication.

In a few countries, Freedom of Information acts legislate the access of citizens to information about themselves, and about the workings of the State. However, most countries in the world do not have such provisions, and it is in the hands of these governments that powerful encryption can be and is being used as a means to hide information that the State is squeamish about exposing to the public eye. Without going into the pros and cons of such behaviour on the part of the State, one can concede that there are ethical aspects to the existence and deployment of encryption for the purposes of ensuring State secrecy.

By encrypting materials that you create, you are protecting your intellectual[1"] property from theft and tampering. You are protecting your moral rights of integrity and paternity, while helping the user by ensuring the

authenticity of your content and providing a warranty of your authorship. As an aside, and since we are covering both ethical aspects and the rhetoric of the debate, it is worth noting that those who argue that access to intellectual property should be free of cost and regulation by legal instruments such as copyright law like to characterise their adversaries as wealthy rightsholders.

The publishers, producers and broadcasters are exacting high profit-margins and thus creating undemocratic separations of populations into the information-rich and the information-poor, This ignores the fact that the original creators of all the content are not the publishers or producers, but individual authors and artists. If content becomes cost-free, and copyright law is relegated to the dustbins of history, a powerful motivation and impulse for much creation would be removed.

While it is true that altruistic and inspirational forces may be behind many of the finest examples of creative output, a great deal of what is produced in the literary, academic, business and entertainment sectors is the fruit of "journeyman creativity"–creative endeavour in service to the economic imperatives of paying the rent and other mundane necessities. Apart from a few literary and artistic superstars, most creators are not wealthy and are rarely adequately compensated for the time and effort they put into their creations. Using encryption and other technical methods to protect content is rather like trying to protect the goods in a supermarket by gluing the cans to the shelves and issuing solvent to customers at the doors. There will always be someone will defeat any technological measure. Encryption methods involve a considerable technical overhead – in terms of computer processing time.

Everything happens more slowly and with more intermediate verification and authentication steps. Once the

content is decrypted, you are back to the original problem, since the decrypted digital object is as vulnerable to transgressive copying and tampering as was the original unencrypted version. This results in the need to ensure that decryption takes place in a secure environment, and generally only in a transient way– which in turn bring in further complications and further processing overheads. Such technical considerations suggest that encryption is not the ideal way to protect some forms of content in specified environments, such as the Internet. Nevertheless, there are other circumstances where encryption serves the purpose admirably. For example, encryption finds a natural use in digital broadcasting, where the single-emitter/many receiver model allows for a scrambled signal being sent in one direction only–to the set-top box decoder–and with very little risk of the decoded signal being transmitted further. Of course, where the local legislation is lacking or weak, decoded signals can be deflected into homes by unlicensed operators.

In general, the use of encryption has the merit of being able to be extremely precise in targeting specified audiences and in enabling a range of individualistic services to be offered. The problem of the "footprint" of the analogue signal being received outside the targeted population can be solved at once. Not all recipients will feel that this is a good thing, but then no-one likes paying for what used to be free, however justified this may be. Thus, encryption is one method for protecting intellectual property in general, and copyright information in particular.

10.9. ROLE OF LIBRARIES IN COPYRIGHTS AND IPRS

The libraries, especially the University libraries should play a key role in supporting research and ensuring access to copyrighted books, journals and on-line materials for poor students in developing countries, but they are typically in a

very poor state. Donor agencies have provided funding to modernize and re-stock libraries in a number of countries including providing Internet connectivity and photocopying facilities.

More of this assistance is urgently needed. But donors' systems are just too slow and bureaucratic to enable libraries to maintain up-to-date textbook collections. Better-resourced university libraries in developing countries, have sometimes serious problems in having to obtain copyright clearance and pay royalties for materials needed by teachers and students. And the evidences reviewed indicates that even these better-funded libraries have had to reduce their subscriptions to academic journals dramatically due to the high costs of maintaining up to date collections.

Indeed, even well resourced libraries in developed countries are experiencing extreme difficulty in continuing to stock the full range of journals their academics and students expect. The rapid increase in subscription prices for academic journals, and ongoing consolidation in the publishing industry has fuelled an active debate on how researchers can maintain access to the materials they need, and the development of alternative models of on-line publishing. But developing countries also need to be allowed greater freedom to relax international copyright rules to meet their educational and research needs.

In order to improve access to copyrighted works and achieve their goals for education and knowledge transfer, developing countries should adopt pro-competitive measures under copyright laws. Developing countries should be allowed to maintain or adopt broad exemptions for educational, research and library uses in their national copyright laws. The implementation of international copyright standards in the developing world must be undertaken with a proper appreciation of the continuing high level of need for improving

the availability of these products, and their crucial importance for social and economic development.

The International Federation for Library Associations (IFLA) has developed a number of goals and a set of principles for the International Development Agenda of the World Intellectual Property Organization (<http://www.ifla.org/III/clm/p1/Library-RelatedPrinciples-en.html>). Two goals seem especially relevant to the field of scholarly communication:

- A robust and growing public domain to. provide new opportunities for creativity, research and scholarship.
- High levels of creativity and technological progress resulting from individual research and study.

These goals can be translated into an action programme with the help of libraries for the scholarly communication as under :

- Libraries and academic institutes can stimulate the use of Creative Commons Licences or similar licences that allow a sharing of copyright, thus enabling the reuse of scholarly information for educational and scholarly purposes. In order to achieve this, raising awareness of copyright issues among academics is necessary. An important target group for such awareness campaigns would be that part of the academic community that also functions on editorial boards of academic journals. Editorial board members can compare the various copyright models with the copyright practice of the journal with which they are affiliated, and ideally propose improvements to the journal publisher.
- Libraries and academic institutions can also influence publishers to adjust their present copyright policies with regard to the reuse of published articles. A study reveals that nearly 20 percent of the authors indicate that they do not reuse their own articles in the way they would

like because of the effort of asking permission. In addition, 4 percent states that they ask permission, but sometimes do not get it. Consequently, nearly 30 percent no longer asks permission. This situation calls for a standardization of copyright licences of subscription journals. If a number of good practices with regard to copyright for subscription journals were to be developed and applied widely, this would give authors and libraries/academic institutions alike clarity with regard to reuse for scholarly and educational purposes for academics, or republication in, for example, institutional repositories for libraries and academic institutes.

Summing up, it can be said that Copyright laws and IPRs are meant to protect the author's basic rights and help in advancement of knowledge and research through rewards to the creators. Rights protection is impeding the access and use of digital information is negating the objective of copyright law. These are not supposed to stranglehold the free flow of information. Nothing can be starker than the present situation, where the institutions and authors have to buy back their own published research, which they themselves had gifted freely, from monopolistic publishers at an exorbitant price. Embracing OA with open arms by content generators is the golden chance to break the shackles on knowledge. All government-funded research works needs to be self-archived and put under minimum restrictive licenses to maximize their use and re-use by the society at large. This can be achieved with the help of library and information centres upto a great extent.

11
Library Consortia

Library co-operation is an age-old concept. A glance at the pages of the history reveals that during 200 BC Alexandria Library shared its resources with the Pergumum Library. In his classic paper on "Prologue to Library Co-operation", Kraus states that during the 13th century, there existed the practice of library co-operation among monastery libraries. There are examples of library co-operation in the form of projected union catalogue of the libraries in the 17th century. The first major union list namely "A Catalogue of Scientific and Technical Periodicals", was compiled by Henry C Bolton in 1885. In the early 20th century, the Library of Congress started cooperative cataloguing projects and began working on the National Union Catalogue. Since then the activities of compilation and publication of union catalogues of different types increased in number in many countries. Thus the efforts made for co-operation resulted in the compilation of union catalogues and non-compilation could have been less effective because of lack of participation of the libraries and their resources over the years. Barney wrote in 1888 about the intolerable management of libraries in the 10th century, where working librarians were trying to develop better ways to meet the needs of their clientele in a more efficient way and saw 'cooperation' as one of the best ways to do. Melvil Dewey wrote on Library cooperation in 1886 in an issue of 'Library Journal'. EA Mac presented his views on "cooperation v/s competition" in the same publication. Taking a futuristic view of library

cooperation R.B. Downs wrote on “One for all: A historical sketch of library cooperation”, which was included in 1969 Symposium of the ALA with the theme of “The Library of Tomorrow”,

The formal cooperative efforts of 1950s and 1960s known as Resource Sharing were born of a union between necessity and possibility. Government agencies, professional organizations and individual institutions realized that certain function, such as cataloguing, could be done more effectively and efficiently in a central location with the results distributed to participating institutions. In retrospect, the 1950s and 1960s came to be seen as constituting a climax of a golden age of collection development and growth, throughout the world. In 1970s it was realized that, entirely new systems of information storage and retrieval should be organized in which all library functions are shared. The 1970s presented a time when the long-nurtured fragile flower of library cooperation blossomed forth in the form of full realization of Library Resource Sharing.

Later the concept of cooperation was further sharpened and extended to embrace activities that could ensure cooperation in all facets of librarianship. Financial and other factors that frustrated libraries all over the world prompted them to move towards a cooperative set up swiftly, and today the theory and practice of resource sharing, and more particularly of multi-type resource sharing is an evidence every where. Thus, the term resource sharing today has also become the life style in all walks of human life. To achieve this objective, the interested parties join hands, pool their resources and work shoulder to shoulder with each other.

11.1. LIBRARY COOPERATION: INTERNATIONAL SCENE

On the international scene, the Library of Congress established the cooperative catalogue and this was soon

followed by the compilation of British Union Catalogue of Periodicals in 1944. In 1966, UNESCO started UNIS1ST to promote exchange of bibliographic data. In 1979, Congress of Southeast Asian Libraries (CONSAL) supported the cooperative ventures among the National Documentation Center for Indonesia and the National Libraries and Documentation Centers of Southeast Asia. In the early 1980s, the European Commission launched new initiatives aimed at library cooperation based on the application of new Information Technology. As a landmark of library cooperation, the British Library offered its strategic plan for 1989-1994 called "Gateway to Knowledge" - a range of cooperative activities among the libraries in UK and elsewhere.

11.2. LIBRARY COOPERATION: INDIAN SCENE

In India too, the library cooperation activities can be traced back to 1868 when Whitney Stokes compiled the catalogue of manuscripts in various parts of India. This was followed by publication part first of Sanskrit Manuscripts in private libraries of Northwest Province covering Banaras in 1890. During that period "A Catalogue of Sanskrit" was edited by F. Kelhorn. More and more cooperative activities came to light and in 1924, Motibhai N Amin organized a cooperative venture called "Pustakalaya Sahayak Sahakari Mandal", to supply books, periodicals and articles to libraries in Gujarat and also the funds and deposits from the libraries were collectively held in a trust. Dr. S.R. Ranganathan was of firm opinion that "library service, bibliographic organization and library cooperation recognize no national or political boundaries. They are international and Bibliographers and Documentalists are International".

NISSAT was established to monitor the information support facilities for people engaged in research and academic activities. Its primary objective was to promote the international cooperation in information. It has helped in

establishing cooperative linkage between information industry, its promoters and users, nationally and internationally. Slowly libraries in India have come together to know each other's existence, and have realized the importance and strength of co-existence, which in many ways facilitated the library services. Manpower sharing and training are other important aspects, brought to limelight by library cooperation. Organized communication in the form of conferences and workshops is established among groups of libraries. The various services exchanged between the libraries vary according to the nature of the members who cooperate.

The well-established Science and Technology Libraries in India act as mentors for the less equipped university and college libraries. As cost of periodicals escalates every year, it is not possible for any individual library to subscribe to many of the science journals. The libraries either resort to cutting down on expensive titles or practice the broad hearted attitude of sharing those journals with neighbours through short-term loan or through duplicating the required articles for their users. This all needed co-operation and sharing of sources among libraries.

11.3. NEED FOR LIBRARY COOPERATION

The need for cooperation is always felt and understood by libraries and librarians since long. Inter library loan being perhaps the most successful and long running example. In fact inter library loan and resource-sharing activities are adjunct to and do not substitute for collection development in the individual libraries. The exchange of materials between libraries is an important element in the provision of library service and it is believed to be in the public interest to encourage such an exchange. The policy of cooperation has produced efficient results in terms of services, bibliographical databases, collective regional catalogue, cooperative

acquisition etc. Currently the library cooperation has extended from the state, regional and national level to international level to bring about a global exchange of information. Library cooperation has induced the librarians to work towards establishing well-connected library networks in their regions initially, without a formal commitment towards its organization and collective funding. Many library networks have successfully extended their services to their users, since inter library loan concept is the foundation for all resource sharing activities. The advent of technology has accelerated this process of faster exchange of information.

Besides, the globalization of education and multi-directional research output constantly enforcing to disappear the borders between different disciplines. In fact, discrete boundaries no longer exist between the disciplines. Therefore, the new paradigm for 'seamless integration of disciplines' posed the multidisciplinary research opportunities, results a great demand for scholarly communications. Moreover, technological innovations influencing the global connectivity through information technology and the concept of 'virtual library' is gaining momentum. The emergence of Internet especially W3 as a new media of information delivery triggered proliferation of web-based resources. Again, increasing use of the Internet—for better, faster, and timelier communication, and phenomenal increase of web-based resources stimulates new range of potential services in modern libraries.

11.4. LIBRARY CONSORTIA

Electronic publishing and telecommunication have enabled library consortia to evolve and expand both in number and functions over the last decade. Library consortium development is rooted in the history of library cooperative efforts and is now also driven by the need to provide remote users with licensed access to electronic resources.

The father of Indian Librarianship has advised consortia approach well in advance in his popular book "Five Laws of Library Science". "Library is a growing organism", one of the Five Laws of Library Science given by Dr. S R Ranganathan, leads whole world to the flap of Consortium. Consortium is the joint venture of homogeneous institutions working for the same objectives. Being a part of consortium, an individual library can spread its wings all around the world with more resources and more services. In today's scenario consortium is the cutthroat need of the hour, especially for libraries. Library consortium is the virtual way to cope with the different problems of libraries through proper coordination and cooperation. Apart from these, duplication can be avoided as the situation calls for optimum use of resources by rational use of funds and it can be worked as platform for training and workshops for providing strength to the information professionals as well as

11.4.1. Understanding Consortia

Over the decade this concept has emerged as a growing area among the librarians, scholars, and publishers. The *'consortia'* is the plural form of *'consortium'* but is often used in place of singular form. It is derived from the Latin word for *'fellowship'* - the meaning emphasizes coming together of separate groups for a purpose. Synonymously the term is used as alliance, coalition, collaboration, cooperation, partnership, etc. Consortium is a complicated organization. It is 'an association' in the sense that is not commonly understood, i.e., a consortium is not a library association, although some associations of libraries may engage in consortial activities. Again, a consortium is not a regional or state system of public libraries, although such systems may negotiate access to electronic resources on behalf of their constituent institutions. Simply, the consortia run to gamut from relatively *informal cooperatives* founded just to realize

economies of scale in purchasing, to highly-organized, centrally-staffed, centrally funded organization; intended to share the resources, and to engage in all manner of collaboration within the member libraries. It has no entity, if there is no common-interest and no member to participate and also the success or failure is very much depends on the members of particular consortium.

According to the Oxford English Dictionary, consortium means a "temporary cooperation of a number of powers, companies, etc. for a common purpose. It is an association of similar type of organization/ institution who are engaged for producing and servicing the common things for providing services for a specific purpose of its users". American Heritage Dictionary (3rd ed., 1993) considered the term - "a cooperative arrangement among groups or institutions. More straightforward description of 'library consortia' would be organizations of libraries formed to realize the benefits and opportunities of collaborative activity. Arnold Hirshon, editor of the *Library consortia management journal,* defines library consortium more broadly. He posted this definition on the web discussion forum on library consortia *on May 27, 1999*– "a generic term to indicate any group of libraries that are working together towards a common goal, whether to expand cooperation on traditional library services (such as collection development) or electronic information services... It is now used perhaps too broadly, and encompasses everything from formal legal entities to information groups that come together solely to achieve better pricing for purchasing electronic information". Therefore the common focus of all definitions are -*'coming together of libraries having common interests and needs, to achieve* a *common goal that is beyond what an individual library could achieve on its own'.* Here we are intending to use the concept as a group of homogenous libraries to deal with the providers of information services as well as the partnership of the libraries for sharing those

services and resources, as well as the bargaining force to deal with the parent bodies for better allocation for the libraries.

The aim of consortia is to achieve what the members of the group cannot achieve individually, and its purpose is sharing of resources, money, and manpower, etc. It is regarded as an effective strategy to increase the buying power and risk-sharing capacity of individual libraries over the short term. It is also an opportunity to maximize the opportunities for mutual collection development and resource sharing over the long term. A consortium has the ability to share resources without sacrificing the individuality of each member library. As a result, the end-users can reap the benefits of more resources than would be available through one library, while staff can customize the system to meet their individual library's needs. It can be a single agency with multiple locations around the globe, all sharing one name, or the consortia members can retain their own name, but use the name of the consortia to identify that they are the part of a larger, often global, organization. It acts as coordinator for the electronic resource sharing at the national, regional and local levels.

Over the past few years' library consortia have taken a new role in transferring the information from the generators to the end-users. Following diagram (Fig. 11.1) depicts the information transfer process in a typical consortia environment

11.4.2. Genesis & Evolution of Mutual Efforts

The genesis and evolution of library consortia are not just for the sake of itself. "The historic quest for the great comprehensive collection has been superseded by the need to provide access to collective scholarly resources that no library can afford". Moreover, the desire to provide users with information to meet their research interests despite a limited budget has always been the prime motivation to librarians. Actually the idea is conceived and evolved from library

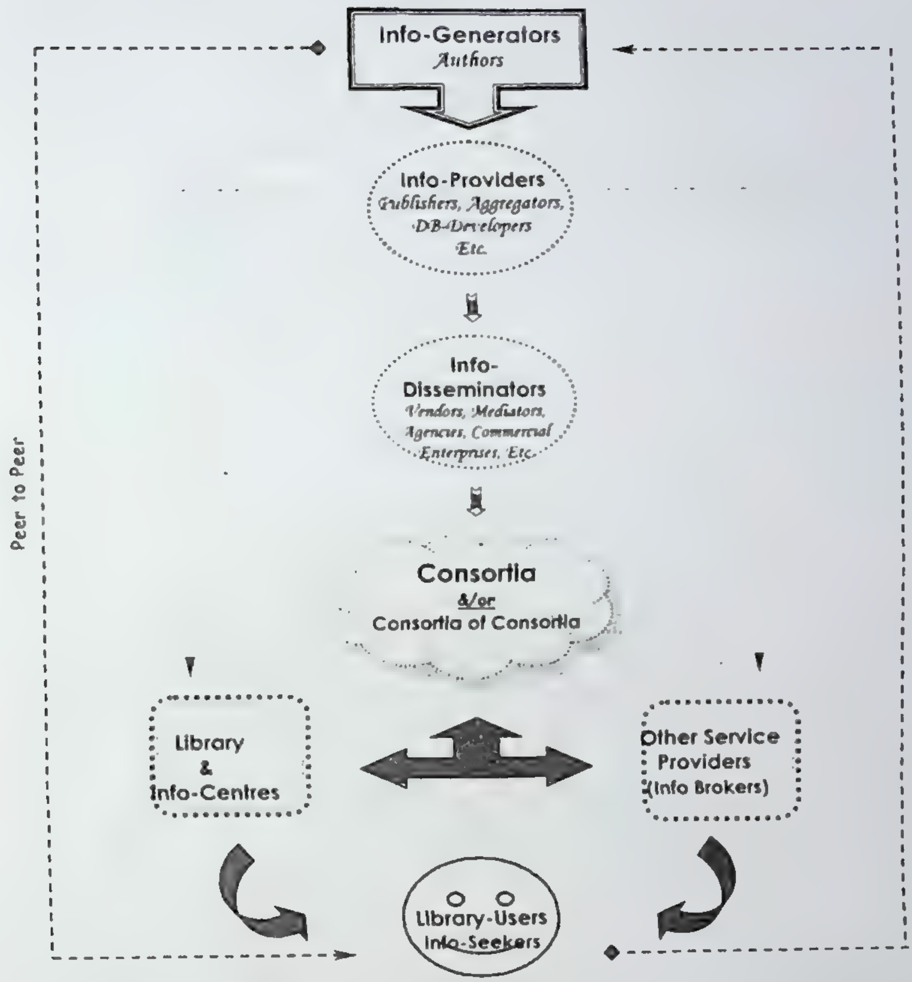


Fig. 11.1. Latest Twist of Information Flow through Consortia

cooperation that has been in longstanding existence in the form of producing shared/union catalogue, resource sharing by providing inter-library lending services. Therefore, the consortium is another form of cooperation for resource sharing. According to Chartron, the term consortium is derived from the field of economics and refers to the grouping together of different independent companies in order to bring together financial or material resources under a single managing body for the joint performance of specific operations. However, the idea of consortia became more relevant and practical for libraries with the advancement of computer and

communication technologies that facilitate the availability of heaps of information accessible from elsewhere. Another evolving desire is to have an availability of the information resources in digital form with attractive interfaces that can stimulate peripheral services like - TOC, alerts, citation, document delivery, etc. based on web technology.

Though the exact date for the first use of the term "library consortium" is not clear but the concept of "consortium" as 'association or partnership' has long been a tenet of librarianship, generally encompassed in terms of cooperation, co-ordination and collaboration between, and amongst libraries for the purpose of sharing information resources. However libraries have not used it widely until about the 1980s. In modern usage, the word was first adopted in the seventeenth century in relation to the association and fellowship between husband and wife. In law the term still applies to the husband and wife relationship. As said earlier, the published literature indicates that Melvil Dewey wrote about "library co-operation", in an issue of the *Library Journal* that appeared in 1886, and a year back E. Mac presented views on "cooperation versus competition" in the same publication. Furthermore, R. B. Down expressed his futuristic view of library co-operation in a paper "One for all - a historic sketch of library cooperation, 1930-1970" included in the 1939 symposium on "The Library of Tomorrow" organized by the ALA. Nfila & Darko-Ampem traces the history of library consortium from 1960 through 2000 and report that an International Coalition of Library Consortia (ICOLC) was formed in 1997. Recently, the formation of consortia is an attractive solution to many libraries. Even the 'consortium' becomes a good word for libraries as it combines the past with the present and the future. Today, electronic consortia have been budding forth in every part of the world in bewildering forms and shapes, and many libraries are already a part of one or more consortia. It is worth noting that the

'consortia' is still at its nascent stage in many countries, like India.

11.4.3. What Makes A Successful Consortium

A consortium can take many forms depending upon their membership, purposes, funding, governing structures, and the commitment of the participants. Therefore the consortium can realize varying degrees of collaborative success. But, what are the prerequisites to effectiveness in a consortium? What characteristics or practices lead to a 'successful consortia'? The following issues have to be taken into consideration for an effective functioning of a successful consortium -

Culture of Shared Vision and Mission: Having a "consortium culture", one that emphasizes common interests, values, visions, and needs is essential. Consortia members should have a high degree of respect for the value of increased collaboration/ shared subscription. Shared vision and mission may, on occasion, results in members having to compromise individual institutional goals to help to advance the common good, and to achieve the greater common goal.

Deep Interest to Obtain Real Benefit: James Koop described it in the following way - "a set of ground rules requiring each members to come to the table taking a consortial perspective rather than merely considering consortial interests. Individual libraries must feel that they obtain real benefit from their membership in consortia, those benefits that can not be realized as easily through their own efforts".

Constant Support and Commitment : It has to be mention that the support and commitment, particularly from the parent institutions, is crucial. Members must also ensure that there is constant support throughout all levels of the organization. Staff must receive support to make the

partnership successful, and be encouraged to generate a result greater than what any individual institution could do on its own. It is also necessary to assure that "organizational and financial commitments once made, stay made".

Authority to Take Action - Take Risk: Having someone with authority to speak for the library and with the ability to act relatively quickly is a factor of success. A consortium, with institutional head directly in its governance, is able to make decisions and take actions at the highest level. Moreover, both consortia and library managers need to possess high grade of 'leadership quality', so that they must not be afraid to lead, to take risks, to commit resources, and to encourage actions.

Centralized Staffing: As general rule, more centralized the consortia, more likely to have dedicated staff. However, the availability of staff to initiate, organize, coordinate, and maintain programs is instrumental to success. While some consortia have been able to function without dedicated staff (but volunteers), increasingly the value of having paid employees whose job is basically to stay focused on joint efforts is being recognized. Many large consortia do have full-time staff – though never enough and a large number rely on volunteers. Truly, it bears a controversy.

Centralized Funding: Centralized consortia may have a sponsoring agency to advocate for external funds. These funds can provide assured purchasing power for the consortium. Some peoples suggest that the availability of pooled or centralized funding is a good idea, to support the subscriptions having limited interests coming from the individual members who desire it. This is essentially important, when publishers/ aggregators do not offer a discount to consortia, in such a situation centralized consortia may serve as the integrator of the publisher.

Linkage: Librarians experienced in forming and

managing alliances advise that it is important to build linkages at all staff levels, especially involving the first line staff. Whether member institutions are near to each other or separated by significant distance, opportunities for participants to meet is obvious. Effective staff communication often depends on personal encounters - is an essential ingredient for the mutual efforts. So, careful attention must be given to establishing right combination of face-to-face versus "virtual encounters".

Healthy Licensing and Technology Infrastructure: When forming consortia, a number of licensing issues are involved with publisher/ aggregator, in order to get maximum flexibility in sharing electronic resources as well as to enjoy best pricing practices. Healthy negotiation in relation to the number of simultaneous users, number of participants in the consortium, selection of resources, wider and consistent access, user friendly interface, pricing formulas, etc. can make the success of the consortia. Ultimately, adequate technology infrastructure in support of wide area information access and management in a consortium is the key to success.

All these, if understood and attended to, will greatly facilitate the formation of consortia and thereby lead to an enhanced access to e-resources. Therefore the above-mentioned issues will have the great potential impact on successful consortia.

11.4.4. Congruity Between Consortia and Publishers

Libraries join together to form consortia to negotiate prices with the publishers. In fact, over the past few years library consortia have taken on a new role - squeezing better deals out of publishers for electronic licenses. Such a deal of negotiation makes the players congruent to play. It has been observed that the *'consortia'* and *'large publishers or aggregators'* have a good deal of congruity and easily can

work together - as they have their natural affinity. Both of them find tremendous advantages of aggregation. The same technological and economic forces are driving and both are having trouble in building and maintaining the technology infrastructure necessary to deliver electronic products. Through consortia -publishers at one stroke can sale the 'package' of their publications to a 'set of customers', one license agreement, one negotiation, one bill, which are efficient for both. This congruity brings the success of consortia boom. Whereas, a basic incongruity exists between the consortia and small scholarly publishing initiatives, as they like to work with individual libraries, librarians, and faculty members, rather than to consortia. This is because they focus on a single or few electronic journals, are not bundled, and they are unlikely to have the resources to deal with the consortia. Typically, either they charges nominal prices or having an unrealistic pricing practice.

11.4.5. Growth of Library Consortia and Global Motives

Library consortia, does not have any remarkable history but the consortial arrangements basically started in 1930s to cooperate in administering 'interlibrary loans' as well as 'resource sharing'. It is worth noting that the office of Education (US) initiated a nationwide study on the growth of the library consortia, conducted by the System Development Corporation (SDC), aiming in view of providing guidance for libraries that are forming or planning to form the consortia. This study identified 125 library consortia – largely focused on academic libraries, founded during a period from 1931 to 1972. Same study reveals that a significant number of 115 – comprising of 92 percent of library consortia had been founded after 1960, a few comprising of 5 in number were established between 1951-61 whereas another 5 consortia had their beginnings before 1950. Ruth Patrick also noted a similar observation in her introduction to *Guidelines for Library Co-*

operation. It would be interesting that, despite the continued growth in number of consortia in 1980s, some other factors like development of 'mega-consortia' (bibliographic utilities) and integrated library systems (library automation) enhanced the involvement of libraries into consortial activities. Allen and Hirshon indicated - "Perhaps the most important development for libraries during the current decade has been the move from organizational self-sufficiency to a collaborative survival mode as personified by the growth of library consortia. They emphasized that, IT is now enabling a level of cooperation that is much broader and deeper than ever before". In 1990s, new types of library consortia began to flourish that exploited the advances in Information Technology. The global development of OCLC in USA is a prime example. It is worth to mention that, in the late 1970s, OCLC became one of the "megaconsortia" deals in the US (and eventually beyond), along with the Research Libraries Group (RLG) and the then Washington Library Network (WLN). Over time the growth of newer consortiums like - Colorado's CARL, Cape's CALICO, Georgia's GALILEO, Illinois's IDAL, Maryland's SAILOR, Missouri's MIRACL, New Zealansd's CONZUL, CAUL, MetroNet, North America's CRL, North Carolina's embryonic NCLive, Ohio's OhioLINK, Pennsylvania's PALCI, Portland's PORTALS, Texas's TexShare, Virginia's VIVA, Washington's WRLC, CIC in South Asia, CURL in UK, CALIM in Manchester, Concord in Britain, METROWeb in New York, SERN in Wales, SUNYConnect, etc...., came into existence in the international scenario. All these new organizations developed as strategic partnership to meet the specialized needs of specific types of libraries. So, there are an expanding number of consortia at all levels, from local to international, and even they are beginning to include other types of organizations as well as libraries, museums, hospitals, research groups, and historical societies. Such an initiative was made through EARL (Electronic Access to Resources in

Libraries) project, in 1995, aiming in view to demonstrate and extend the ability of public libraries to deliver networked information and knowledge-based services over around 160 local partners and 25 associate partners in Govt. professional, educational and commercial sectors in UK.

Therefore, a rapid growth of consortia has taken place with the changing environment of libraries. Still, we always like to have more changes and always look for the new ways to improve the old techniques in a Darwinian way - techniques for consortium building – from 'Single-sector' to 'Multi-sector' and 'Mega consortium'. Perhaps the real sign that library consortia have returned big time is the formation of 'Consortium of Consortia'. For instance, New York consortium of consortia is composed of fourteen member consortia, and it in turns belongs to larger groups such as the ICOLC *(International Coalition of Library Consortia),* formerly named as "OhioLINK". ICOLC is a semiformal entity of self-organized group derived from informal contact between leaders of some new and established consortia who eventually decided to come together in a more formal fashion to meet with publishers and to discuss issues of mutual concerns. ICOLC arranged its first formal meeting at St Louis in February 1997 and over fifty individuals from twenty-seven consortia were attended. Basically it comprised of over 150 library consortia and represents over 5000 member libraries worldwide. It was originally made up of consortia predominately from the US but it has expanded to include consortia from Canada, UK, Australia, Netherlands, Germany, Israel, and other countries of the world. The Coalition primarily serves its members and higher education institutions by facilitating discussion among consortia on issues of common interest. ICOLC conducts regular meetings to keep members informed about new electronic information resources, pricing practices of electronic providers and vendors, and other issues of importance to consortium directors and their governing

boards. Moreover, it likes to promote the consortia deals to obtain "mega-deal".

There are other signs of the recent growth of library consortia. Ball and Pye's study on library purchasing consortia, depicts that around 60 percent of consortia that responded to their survey had become active within past few years. Now, regularly we are having round-tables, workshops, and conferences on consortia, even online web-forum of consortia also exists. Also we have the journal on consortia entitled *'Library Consortia Management - an international journal* that has been started its publication from MCB University Press, UK since 1999. This journal provides insights and describes methodologies to improve the negotiations of consortia licenses and to manage the library consortium as an organization. It also covers various emerging issues on consortia and other means. MCB Press also operates an online web forum for further discussion and querying view regarding library consortia. Today publishing houses also have their consortial advisory boards. One might argue, publishers are themselves forming consortia! - The answer is still found to be due. Most of the larger publishers like OUP, Elsevier, Springer, Wiley, etc. and learned societies – AMS, IEEE, AEA, etc. are finding viable solution to sale their e-resources through consortia. Sometimes not just through consortia, but through the groups of layered consortia or multi-consortial deals. All these activity indicates a steady growth of library consortia in real practice.

11.4.6. Aims of the Library Consortia

The primary objective of the Library Consortium is to encourage and facilitate interlibrary communication, education and resource sharing within its diverse multi-type library membership.

Today Consortium purpose is shifted from mere sharing

of resources to sharing of expertize between libraries and also explores the need for libraries to make the most effective use of their funds collectively.

11.4.7. Need for Library Consortia

Academic (University & College) Libraries & Research Center Libraries with the impact of Information Technology are compelled to provide relevant information essential to its end users within a short time either from its in-house holdings or through Consortia. Inflation and Budgetary reductions are the primary force that brings the idea of consortia development.

11.4.8. Salient features of Library Consortia

The sailent features of Library Consortia may be narrated as under.

- They eliminate the different problems faced by the libraries to provide various services to the users.
- They meet the thrust of information of the vast people due to rapid growth of population all over the world.
- They cope up with the newly generated knowledge published in different forms, such as, printed and non - printed documents, electronic media on various disciplines, multi-disciplinary and new generated subject areas.
- They collect all the documents published at the national and international level, because of the library financial crunch.
- They may be used overcome the language barriers i.e.:- primary documents are being published by the developed countries like USA, UK, France, Japan etc, and among them the non-English speaking countries produce majority of scientific literatures in their mother

languages.

- Single payment by one of the participants or through an agent and license has to be signed by all.
- The members are expected to maintain same level of subscription.
- Publishers found it convenient to negotiate with members through an agent and agent raising individual invoices to ail members and single payment to publishers.
- Institution-wise usage statistics may be collected to ascertain as to how often user's access to all titles subscribed.

11.4.9. Principles to Govern the Consortia

The important prinicpIes for governing them are listed below.

- Flexibility to choose your own library management solutions, vendor and select the member libraries with which you will share resources.
- Flexibility to own, manage, and control your library's records and enforces its policies.
- Flexibility to extend access to even more information with an information portal that shows your library's face.
- Flexibility to share physical and digital resources.
- Flexibility to enable your library users to search and place holds on the resources of your own and other member libraries and to enable users of other member libraries to search and place holds on your library's resources.

11.4.10. Functions of the Library Consortia

The main tunctions of consortia are – Collection Sharing, Electronic Content Licensing, Electronic Content Loading/Presentation, Inter - Library Loan / Document Delivery, Preservation of documents. Also to gives training to involved library staff and making Union Lists / Shared Online Catalogues and working on new forms of scholarly and scientific communication.

11.4.11. Benefits of Library Consortia

Consortia-based subscription to electronic resources provides access to wider number of electronic resources at substantially lower cost. The Consortium, with its collective strength of participating institutions, has attracted highly discounted rates of subscription with most favorable terms of agreement. The Consortium is proposed to be an open - ended proposition wherein other institutions can join and get the benefit of not only highly discounted subscription rates by also the favourable terms of licenses. It is seem that the Consortium have been offered better terms of license for use, archival access and preservation of subscribed electronic resources, which would not have been possible for any single institution. To make optimum use of the major benefits of the consortia model, the participating libraries have to consider the following basic requirements:

- The library should possess computers with minimum storage capacity and with up-to-date configuration.
- The institute may have intranet facility integrated with library network.
- Linkage to library in the institute website or a separate website for library in order to list and link the accessible resources so as enable the users by right dissemination.
- High level of coordination and mutual relation between

ICT unit of the institute and library personnel is warranted.

- Minimum of moderate level of ICT Skills of library personnel on Internet, e-resources, networking is immense to educate the user for optimum use.
- Though there will be a central coordinator of the consortia, association with publishers, aggregators and librarians are required at an extent.
- High bandwidth, static IP and quality internal network facilities (cable network with optical fibre,WiFi, etc.) have to be ensured.
- The librarian and senior library staff must be familiarized with all the resources which are to be accessed through consortia and to have appropriate information literacy program among users to enhance the use of the consortia.
- Mutual understating and effective coordination at times is a prerequisite for successful implementation of the consortia.
- Budgetary provision for consortia may be legitimized through the license aggrement committee or management of the institutions.

The benefits of consortia are discussed in details as under :

Foster Resource Sharing: Besides sharing financial resources, members of consortia can share a variety of other resources. Helmer emphasized that "for libraries, consortia provide shared expertize, access to new electronic and print resources, professional development, new sources of funds, and safety in numbers...". The resources that can be shared by consortia includes the following;

– Sharing catalogues, sharing collections and in collection

development and content creation.

- Sharing electronic resources, sharing storage of resources, sharing archiving of resources.
- Sharing staff expertize, sharing risk, sharing success and professional glamour.

Enhance Library Services to the Users: O'connor described the benefit of consortia to be customer- focused. If becoming a consortium member is not going to benefit the library's users, then the library must question its reasons for becoming a member .

Improves Quality of Library Services: Since mid-1990s, there was a growing national emphasis to improve the quality of library services and to reduce the cost of operation as part of the process. Libraries turned to consortia as a way to share information about and to foster best practices, and to reduce the unit cost of providing core services. It consolidates the library services in a good deal.

Increase Financial Benefit: One of the most common reasons that libraries join consortia is to gain some financial benefit. "All library consortia have one goal in common–pooling their collective financial resources to leverage greater economic control over their marketplace."

Encourage for Discussion, Collective thinking and Leadership: Intangible benefits, such as the encouragement of discussion and collective thinking is a valuable part of being a member of a consortium. Shoaf points out that the value of increased communication between libraries cannot be overlooked. Leadership is also an important part of library management. Consortium services manage more than the cost and a consortium can do this by providing leadership for its members that generates cooperative action for the advancement of educational environment, institution's fiscal health, and the quality of services for the client of the library.

Demonstrate Reduced Cost: In a situation of limited funds, any measures taken by a library to reduce costs can be seen by stakeholders and the public as a positive way for libraries to maximize their resources. To reduce the cost of member library operation, consortia act as an agent on behalf of the member libraries to seek a reduced group purchase price for information resources that is lower than that which any one institution could achieve alone. Therefore, it considers new ways to consolidate global resources amongst the participating libraries in order to maximize their resources within limited budget.

Facilitates the 'Change Management': One of the most complex issues facing libraries today is change management. The decisions face are becoming more complex, the risks are greater, and the resources are both human and fiscal, are becoming more spare. A library consortium is particularly valuable in managing the change. The process of change management normally proceeds through a . series of steps. Each of these steps involves significant risk. Change management is the process of minimizing those risks and optimizing the opportunities. Juechter et. al have written that "An organization needs external coaches to catalyze, guide, and facilitate a change process", because those who are already in the organization are too close to the situation to see things objectively. It is best to have someone from outside.

Provides Training and Workshop: To manage change libraries must have an understanding of emerging issues. The consortium can play an invaluable role by providing training and organizing new programs or promotional activities – library improvement plan, classroom library plan, schools of library computerization, etc., to upgrade the existing staffs.

Enables Better Access: Promote better, faster and more cost-effective ways of providing access to electronic information resources to the information seekers. Increasing

amount of access to electronic resources is possible, across the institutions, at a lower cost or at an optimum cost possible for the subscription.

Facilitates Better Management: Consortia can manage the electronic information resources in a better way and save the library from the hassle of print-resource management. It enhances buying power through the consolidation of collection and services.

Sustains the Pressure: Library consorties successfully meet the pressure of diminishing budget, increased user's demand, and rising cost of library resources.

Protects from Duplication: The duplication of materials (cost), time, and effort can be minimized and savings and access can be maximized. A consortium also protects the duplicate manpower expert, guide, online serial-control manager, system analyst, network manager, problem counselor, architectural consultant, etc., by providing collective technical expertise in general or even detailed and specific levels of assistance, to member constituents.

Accelerates Sustainable Growth of Libraries: The collective strength of consortia members facilitates the libraries to get the equal benefit of wider access to electronic resources at an affordable cost and at the best terms and conditions. It also demonstrates the benefits to offer not only in terms of discounted subscription rates but also value added services like Document Delivery and Search Interfaces and finally it brings the uniform growth, standard, and compatibility among the member libraries in a better to better situation. All these are indicating towards sustainability of the growth of libraries.

Besides, benefits are manifolds which facilitates ongoing the communication, co-ordination, awareness, creates information super-highway, professional

improvement, force to maintain standard, cultural broadness, increased visibility, preferred partnership, marketing and advertising opportunities.

11.4.12. Library Consortia: Bridging the Gulf in the Availability of Information

The phenomenon of information revolution has posed several problems and this has far reaching implications in the society. The nation or society which possesses more information will lead the world. This is also true in the case of individuals. The persons have more information will guide a group or society and they will be superior to others. This power of information has induced the nations and individuals to acquire and control more and more quantities of information. But, in this race, the poor nations, societies, institutions or individuals will be back as compared to others. This has created a big gulf in the availability and use of information. A study by Francis in 2005 revealed that while 77 percent (total no. 2,31,510) of the higher education faculty in India were engaged in the affiliated colleges, only 23 percent (total no. 69,283) of the faculty were engaged in the Universities. Though the salary and other emoluments given for the faculty in colleges and universities are same, there is much difference in the scientific productivity and research out contributed by these two classes of the faculty. A major reason for this difference is the lack of availability and use of research information.

As compared to the university libraries, only a meager amount was allotted for college libraries in India. Over the time, academic institutions typically have spent a decreasing percentage of their educational and general budgets on their libraries. Nonetheless, academic institutions and library clients expect their libraries to obtain new electronic resources while simultaneously maintaining or growing traditional print collections until the electronic resources are fully stable.

Libraries also are expected to do this with no additional funding. Academic libraries and information providers must use information technologies to facilitate increased information delivery and to make e-information more generally, readily, and flexibly accessible than its print counterpart. The current practices of journal acquisition in most of the acedmic libraries especially in the colleges are print based, in which each library is an island with regard to access of information. The digital libraries expected to increase information access. They will allow for greater standardization of data, multiple and remote access to information resources, easy sharing, etc.

The Library Consortia can be an ideal solution in this context, if that has been established and managed at the wider interests of the society and the mankind in total. The activities and operations of the library and information centres are being influenced and drastically changed with this new approach to information management. The pattern of common acquisition, subscription or licensing for access by the consortia will benefit more to the poorer group.

The conventional practices of journal acquisition are grounded in the legacy of a print-bound world in which each library is an island of access for its own patrons. But with electronic desktop delivery of information, the increased ease of access allows far greater information use than previously possible. Experiences of the several libraries show that the improved ease of access has demonstrated the high elasticity in information usage. Libraries in consortia model of purchase of electronic journals can seek this desirable outcome that provide for expanded journal access. A study in the Ohio University Library System reveals that the use of journal titles has increased by three times than they previously held in print. Even the small and new colleges were also the beneficiaries through access to scholarly journals. As the evolution to broad scale electronic access continues, libraries

and consortia must take advantage of the opportunities to adopt sustainable economic model of information purchase that maximizes information use.

There are several efforts to operate library consortia at regional, national or international levels. The Washington Research Library Consortium (WRLC) is a good regional resource-sharing organization established by several universities in the Washington, DC metropolitan area to expand and enhance the information resources available to their students and faculty. The International Coalition of Library Consortia (ICOLC) is an informal organization that began in 1997, comprising about sixty library consortia in the United States, Canada, the United Kingdom. The Netherlands, Germany, Israel, and Australia, the Coalition represents over 5,000 member libraries worldwide. The Coalition serves primarily higher education institutions by facilitating discussion among its members on issues of common interest.

11.4.13. Consortia Issues

The library consortium activity is a complex process, which involves the wholehearted support and concerted efforts of the librarians, their management and the publishers. They form an important trio in the new scholarly information environment. There are umpteen number of issues relating to consortia like zeroing in and identifying the resources, uninterrupted online access, perpetual access to back issues, pricing, licensing, subscription payment, copyright and archival solutions etc. Planning and implementing the right kind of IT infrastructure is yet another pressing issue.

Resources Identification : Identifying the most suitable product which is agreed upon by all the members of the consortium is more or less a difficult proposition. This is mostly because each and every member will have their own wish

list of information products and services, though the overlap between the products will be on the higher side in the case of an ideal homogeneous group.

Technology Infrastructure : Long range planning and sourcing of the appropriate Information Technology and Communication infrastructure conducive for proper delivery of information resources is pre-requisite for every participating library.

Pricing Issues : There is no standard practices or processes being followed by majority of the publishers of scholarly literature and hence this is a gray area all together. In most cases cost of the journals are out of reach of many of our libraries and only a consortia approach could provide some meaningful practical solution. Publishers are invited for negotiations and asked to offer their best prices to the consortia. Several methods of pricing are followed, but what is important is that finally the price offered by the publisher should be economically viable for the participating libraries. And it should also ensure uninterrupted and perpetual access to the resources.

Access related Issues : There are various access methods offered by publishers towards accessing their resources and it varies case to case. Access authentication could be User ID / Password based or IP based which are popular among them. Uninterrupted and hassle free access to the scholarly content is the ultimate objective of the consortium.

Licensing and Copyright Issues : As against the print paradigm, the E-Journal subscriptions and access models allow only licensing of the content / product for a stipulated period of time which has several restrictions and bindings on the licensee. There are number of issues which are under debate between librarians, users and publishers which need international attention and solution.

Archival Issues : This is an area which needs utmost attention and unfortunately this is yet to be attended to by the consortia in India. Long term preservation of the invaluable wealth of information being accumulated by the consortium is to be archived and preserved for posterity. As the technology is fast progressing and also getting obsolete almost at the same pace, it is high time that these costly information resources are care fully archived and preserved on a long tern basis.

Sustainability Issues : The designing and launching a library consortium is perhaps the easier part when compared to its long term sustenance and longevity. The management and the members of the consortium have to strive hard in formulating and establishing robust models towards achieving the above goals.

Usage and Usability Issues : The ROI (Return on Investment) of the consortium is measured in terms of the increased usage usability of the costly information products which is ultimately reflected in the scientific productivity of the host institutes. It is the earnest efforts of the consortium, the management, the researchers and faculty and the librarians which determine the success or otherwise of any consortium.

The other concerns may be listed as given below :

Consortia without Legal Entity : Consortia of libraries need to have a legal entity with permission and authority to deal with institutions like banks, since it would be involved in collecting subscription/ membership amount from the participating libraries so as to make payments to the electronic publishers. In the process, the consortium has to deal with banking organizations like RBI for arranging foreign exchange on behalf of the participating libraries.

Problems in Budget Allocation and Funding : These

are always a thorny issue. Belonging to a consortium means a part of library budget will be transferred to the consortia, but it is rarely possible to know the consortia subscription cost of the available resources in advance. Even the consortia cost can vary enormously depending on the number of participating members and license negotiation. Therefore the problem exists in budget allocation to the individual libraries - as the library can not predict the possible price packs for consortia resources at the time of it is budgeting. Same time, the consortia can be ignorant about the number of participants and negotiations for the resources, so as to difficult to forecast the exact concessional benefits available to the participating libraries. Moreover, lack of initial funds for participation could be a barrier to the formation of a consortium.

Problem in Transfer of Funds : The consortia need to be pooled together from various participating libraries to make an effective shared-subscription. But in common practice, the rigid administrative, financial, and auditing rules always create the problems in transfer of funds. Most frequently the audit problem lies in defining the assets and volume of access against the payment. In a library subscription, audit generally allows to make payment only against proforma-invoices from the publisher or vendor or society, etc.- but not from a consortium. However, for any consortium subscription, publisher will send only a consolidated invoice to the head of the consortium but not to the member libraries of the same consortia. In such a situation, rules and procedure may not permit member libraries to make payment of the subscription cost of the consortia, unless the consortia itself can raise an invoice - here the question of formalizing the consortium might arise and audit hardly allows the payment against such invoices.

Lack of Awareness and Understanding : Librarians, especially in India do not fully comprehend the concept of consortia based subscription to electronic resources and are

not very keen to go whole heartedly for the formation of consortia among libraries. Sometimes they do not have good understanding about consortia benefits and often fail to get the opportunities. Even many libraries feel like to think that their financial contribution may not be commensurate with the benefits they get from a consortium.

Problems in Local Decision-Making & Control :There is a fear that if a library joins in a consortium then local decision-making, autonomy, and control will be adversely affected. Virtually, the library authorities sometimes express their negative attitudes towards consortia. Moreover the libraries will not have the freedom to drop any title – as once committed, in lieu of any other new title.

Egos and Attitudes : Egos and attitudes of individuals or organizations can have a big impact on the success or failure of a consortium. O'Connor described, "to be a chief in one arena but to be an Indian in another requires not only a different commitment but also very different strategies and operating modes". It is also difficult to change the old mind-sets of librarians.

Speed of Decision-Making : A notion that exists, belonging to a consortium - the speed of decision- making of individual libraries can slow down. Though it depends how centralized or decentralized the consortium is.

Fear from Local Identity : Most of the libraries do not want to feel like - they are losing their individual identity. Rather they like to think that the participation in consortia may loss their local identity and importance.

Type of Agreement : The agreement between members can have a major impact on the consortium's effectiveness. It has been found that some libraries did not join in consortia simply because of the agreement that was not of their choice.

Technological Compatibility and Security : Compatibility among the computers and communication systems of the participating members is very much required for a consortium, to maximize the benefits of IT. In most of the cases it becomes a critical issue. Say for example, if a consortium is mutually agreed to access an online database with five simultaneous logons among ten constituent members through the recognition of IPs. It means at a given time maximum five users from the member sites (ten) can access the same database and no one is required to hold any password. But, if any member has only dial-up connection (i.e. without IP) instead of lease-line then it would be very difficult to accommodate the member with simultaneous access facility, as the member has Internet connectivity that is incompatible to others. Security is also another technological issue.

Multiple Consortia Memberships : Individual libraries with multiple consortia membership can be a barrier to follow-up actions and to adjust with variant consortia cultures. So, multi-type-partnership may cause the conflict and cultural gap, is a genuine barrier to library consortia.

Geographic Distance : Distant location of participating libraries may be a meaningful barrier to effective communications and discussions, which is an essential ingredient for a successful consortium. Whenever the member institutions are separated by significant distance then the opportunities to meet or face-to-face discussion is a cost factor. 'Virtual encounters' is only the way.

Specific Institutional Problems : Every institution/ library has its own specific problems related to work culture, environmental differences, compromising attitudes, policies, etc. These specificity behaviours of individual libraries can be a big constraint of a consortium.

But inspite of above issues, concerns and hurdles, the

are continuously in e-environment for providing information access to users.

11.4.14. Models of Library Consortia

There is no single best model for a library consortium. It is seen during past three decades, libraries have formed a variety of organizational models to obtain different kinds of supportive measures for the participants. Hirshon suggested three potential partners for libraries wishing to participate in a consortium - Information providers (*publishers),* Service providers *(vendors, aggregators),* and Others *(archives, museums, art galleries, educational groups, etc).* Initially, library consortia were mostly restricted to the academic sector, but the tradition is changing gradually, even they are beginning to include multi-type organizations as well as libraries, museums, hospitals, research groups, and historical societies. Eventually they are resisting with the newer models. Such an initiative was made through EARL project in 1995, aims to demonstrate and extend the ability of public libraries to deliver networked information and knowledge-based services over around 160 local partners and 25 associate partners from government, professional, educational, and commercial sectors in UK. To cope up with various potential partners, a consortium can evolve from one model to another; as their members become more comfortable with each other to develop a collective agenda, and to participate to a greater degree in consortial activities. Therefore, the 'Consortia models' are emerged in different dimensions. These are broadly categorized as follows.

Eminent experts of consortia proposed these models, as summarized below :

Allen and Hirshon Model (1998) : It views that each consortium as being at a point on a continuum. The position on the continuum is based predominantly on the governance

structure of the consortium, whether it is a formal or informal, centralized or decentralized structure. The points on the continuum are - loosely knit federations, multi-type/ multi-state networks; tightly knit federations, centrally funded statewide consortia.

O'Connor Model (1999): It provides four models that are predominantly based on how the consortia are funded - Off the Top, Get on with It, Let's Help Ourselves, Do it our Way.

Helmer Model (1999) : This model identifies a wide variety of models of library consortia based on the following characteristics - those formed by the Government mandate, License electronic resources, Offer other services, Has legal status, Has central office with or without staff, With or without central funding.

Haavisto Model (1999): This opines library-licensing consortia in terms of how a consortium is managed and what needs to be looked at when entering into a consortial agreement. Haavisto looks a consortium can be managed by - a member of the consortium, a new legal entity founded by the partners, an outside agent.

There are some other Observed Models, which are simply based on the observations, as described in various library literatures.

By Sector : These are categorized by the type of libraries those participate in each consortium. It may be Single sector, Single sector with state or national library environment, Multi sector, Mega-deals.

By Funding Source : These are categorized by how the consortia are funded. Funding may be Internal, External, or Combination of both. Sometimes it is described as Centralized or Decentralized funding.

By Governance or Organizational Structure : These are categorized by how formal their structures are. Governance structure may be highly informal, semi-formal or formal; organizational structure may have a central office with dedicated staffs or without having a central office and dedicated staffs.

By Degree of Integrity or Affiliation : It is basically categorized by the intensity of integration among the constituent members. There is a broad spectrum - at one end of the spectrum there are loosely affiliated buying-clubs and at the other end there are tightly integrated organizations to retain long-term commitments for collaborative sharing.

By Specific Interest : These are categorized by the predominant interest or special interests of the members to come together. Commonality of interests may go through Discipline (Medical libraries consortia), Apex body (UGC-Infonet, CSIR consortia), Organization type, (Govt. vs Non-Govt.), Information need (INDEST for Science & Technology information), Funding authority/ agency, etc.

By Geographical Location : These are categorized by the area or location covered by the consortia. They may have single identity with single/ multiple locations or may consider multi-national consortia deals. They can be a local, provincial, regional, national, and even international level -often global.

If we talk about India Specific Models, a variety of organizational models of consortia have been emerged in India based on their objectives, structures, member participants, funding sources, etc. A few of the prevalent categories/ models of library consortia represent a proto-type of a variety, which are being practiced in the library community in India.

Open Ended Model : Open-ended model means any library can join within a defined framework or terms of

references and number of members are not fixed, eventually flexible. Here the participating libraries have the freedom to join or leave from the consortium. This model suffers from sustainability problem, as the members can quit at any time. FORSA and INDEST (partly) are the prime examples of this type.

Closed Group Model : Normally formed within a defined group based on certain criteria and the constituent members are homogeneous among themselves where the members have a common need to cross share the resources in a specific area. Here the guidelines and administration is fairly simple and easy. CSIR consortium (based on institutional affiliation) and IIMs consortium (based on homogenecity) are the example to this type.

Shared-Budget Model : This type of consortia emerges with the proportional sharing of funds of the participating members, which is operated through the MoU for better and strong understanding. For instances - FORSA, HELINET, IIMs, etc. belong to this model.

Centrally Funded Model : Here the existence of the consortium solely depends on the central funding agency, eventually imposed regulations by the funding authority. Here source of funding often dictates the structure of the consortium. For example, UGC-InfoNet.

Publisher Initiated Model : Here, the publisher formally quotes a consortia price with attractive discounts for the participating libraries, obviously with the precondition that there should not be any discard in their print subscriptions. Such pricing practices by the eminent publishers/ societies are coming up for the developing countries - like India. Say for instance – Consortia price for ScienceDirect (from Elsevier Science & Associates), for MathSciNet (from AMS) and so many.

National Venture Model : Basically this is a national level initiative, but in India it is partly initiated through UGC-InfoNet (national license for Encyclopedia Britanica was taken but it is dicontinued now) and INDEST (national prices for various e-resources). A national consortium can greatly reduce duplication of efforts/ resources and also provide greater purchasing power. Still the implementation is pending in this direction. It is hoped that National Knowledge Commission will take such initiatives in near future.

Headquarter Executed Model : Such type of consortia is driven by the Headquarter of a particular organization. Here the head-office of the branches/ institutes solely shoulders the financial responsibility of the consortium and the consortium is fully guided and executed by the head quarter. Consortia subscriptions among the centers of ISI.

Some operational models are described below in details.

Same Funding Agency - CSIR : CSIR and its 40 laboratories have successfully negotiated with a major publisher for consortium licensing covering their entire database, making payment from headquarters for access to e-joumals. This is a large consortium formed during 2000 after prolonged discussions keeping in view various parameters from the point of view of pricing viz. – number of subscriptions, number of subscribing laboratories, number laboratories not subscribing, print based price, add-on to e-access, access fee for non-subscribers and host of other parameters, which will not qualify for model keeping in view large number of parameters vis-a-vis spread of laboratories across the country, absence of facilities in some laboratories, heterogeneous groups, etc. With cooperation and willing support of some dedicated library professionals, the consortium went through successfully and it is to be seen now, while renewing license, how potentially all 40 laboratories

are making use of the database subscribed with cross e-access to large number of journals. For renewal, internal review has to be carried out to assess usage pattern from all laboratories and justify the amount spent.

Headquarters Funding Main/Branch Libraries-TIFR : TIFR and its five branch libraries located at different locations in the country have gone into formation of consortium with major publishers. Headquarters arranged payments after negotiations and after successful completion of one year and its smooth running renewed for the second year. All the members and users are happy with arrangement for accessing important journals among themselves. The publishers should also be happy for the reason that with little administrative efforts, negotiations/payments were settled.

It was a win-win situation for both the parties, since the negotiation was based on print subscription by member libraries and one of the branch libraries has the advantage of accessing entire offer of journals and not subscribing a single title from the concerned publisher. This could be an ideal multi-site model, where administrative and payment aspects are handled by parent organization.

Central Agency Funding Directly - MHRD-INDEST : An Indian National Digital Library in Engineering, Science and Technology (INDEST) was set under MHRD, Government of India, initially covering 38 major technological institute including IISc, all IITs, NITs, and IIITs. It is an open ended system with provision for adding new members by shared subscription through a consortium of libraries. It hopes to increase access to e - journals and important databases on negotiation with major publishers.

Keeping in view, what science and technology libraries used to spend annually, INDEST investment is much less and could provide comparable or even better facilities of information sharing.

There are other 'nets-' getting ready or already swung into action in forming consortia, viz. UGC, ICAR, etc and small scale level- FORSA and DAE libraries. In due course, INDEST should be able rope all parallel consortia into its fold and make a truly national level consortium to negotiate national site license for all multidisciplinary areas.

IIM Digital Library Consortium : All Indian Institute of Management libraries have been striving for resource sharing in areas such as cooperative acquisitions, processing and decentralized utilization. IIM libraries consortium has been in existence since last many years and negotiated for acquisition of databases and electronic journals.

INDEST Steering Committee meeting held on 18 April 2003 considered favourably to constitute Special Interest Group for IIM Library Consortium and thereby taking care of consortium based resource requirements of all management schools of INDEST members. The Group has recommended that the SIG: Management Schools to be known as "Electronic Resources for Indian Management Schools -ERIMS" and looking forward to subscribe to electronic resources.

Different Departments/Homogeneous Groups-FORSA : This is yet another model, wherein Institutes are affiliated to different departments of central government. The model envisaged from this group is briefed in nutshell reflecting how library professionals come together willingly and support for consortia formation.

Unlike others, this group has an informally established forum, which needs a briefing to reflect how homogeneous, like minded professionals come together for cooperation, coordination and collaboration in resources sharing and initiating need based consortia formation in the changed environment.

Subscription, Access and Pricing Models : A variety

of subscriptions, access and pricing models are in vogue for E-journals. Electronic journals are literally the entire journal, along with the full content retained in print – if there exists a print version, available in digital format and accessible online throughout the world. An electronic journal is therefore a whole journal, and libraries can subscribe to electronic journals from publishers or through a second party – e.g. vendors just like they subscribe to print journals. This distinction between publishers and second parties is an important one, as these are the major two ways libraries get electronic journals. Some companies – also known as aggregators, create collections of entire journals and sell access to these collections. In summary, there are three major ways through which electronic journals could be sourced in libraries:

- E-Journals sourced directly from publishers
- E-Journals through second parties such as journal vendors and Gateways (Ingenta, JStor etc), and
- E-Journals through journal aggregators (Proquest, EBSCO etc.).

Access to E-Journals could be arranged from the respective publishers against User ID / Password or through IP authentication. For a wider audience like campus-wide, enterprise-wide networks, IP based access is mostly preferred. Some publishers even offer both the access options. These decisions are mainly based on the publisher's policy on online access and how much restricted the access to be.

There exist a number of pricing models for electronic journals such as the online only, online and print, print and online, flip-pricing, pay-per-hit, pay-per-view, pay-per-download, pay-per-print, deeply discounted pricing etc. Some of the other popular models include the FTE (Full Time Equivalence) based pricing", "core subscription plus pay-per-

view", "usage based pricing", "licensee membership fees" etc. Based on the nature of the subscription / licensing arrangements and the availability of funds a number of models can coexist in a practical library setting.

It is disheartening to note that neither the libraries nor the publishers have sufficient experience towards fixing the cost of E-Journals. This is an area where libraries are being severely exploited and this need to be addressed on a war footing.

11.4.15. Client Service Programmes and Library Consortia

Librarians who are trying to solve intractable problems, such as how to improve the quality of their customer service, can often feel much like Alice, trying to find answers to impossible riddles. To whom can these perplexed librarians turn to help them find these answers? Increasingly, librarians have turned and should be turning to library consortia in an effort to glean a shared approach to the problem. Consortia can be very effective in this regard because, through their regular interactions with their member libraries, consortia gain a breadth of information that can prove very helpful in developing best practice models.

For any library that is trying to develop a customer service program - and for consortia that are trying to assist in that effort it is important to understand the trends that are affecting the client base, the component parts of the customer service plan, the process to be followed to develop and implement that plan, and where consortia can provide added value.

11.4.15.1. Information Services: Trends affecting Client Services

There are some key, but not necessarily related, general trends in the world of business and the ways in which they

use information management today that can be very instructive to libraries that are trying to develop a new client service model built in a technologically changing world that is increasingly built around electronic commerce. The first such trend has been the recognition that good customer service is good business. In the business world it is no longer sufficient to provide low cost services, or non-value-added services. Businesses rely on repeat customers, and the most effective way to guarantee that is to provide service that is not only courteous and helpful, but also effective, efficient and predictive of individual needs.

Second, the trend toward outsourcing non core operations to external services providers has the potential for significantly improving or degrading the Quality of Customer service ("QOS") in libraries. Outsourcing can have a very positive effect on service if it is used to speed delivery time, reduce backlogs, improve the quality of services, or reduce internal costs to reinvest funds in public services. All of these are relevant to libraries as well, and library consortia are often the agents that libraries hire to outsource a particular service. Consortia can be very helpful to the libraries when they stress to libraries that it is the QOS factors that, when outsourcing, should receive as much consideration as - if not more than - simply trying to reduce costs.

The third trend is one in which the effects are likely to be more long-term and evolutionary– the shifting of services to be Web-based. Technology has changed client expectations, their patience, and their willingness to accept services that the library provides only at its own convenience. Clients expect services that are customized and available on demand, and the Web is providing fertile ground for this. Electronic commerce is changing the way in which people seek and use information services and products, and the competition has become fierce. This transition has been under way for a number of years, clearly accelerated with the birth

of the Web, and is now becoming a rampage with the widespread availability of electronic text, images and sound files. Consortia can become excellent facilitators in the process of collecting, digitizing, organizing and making accessible these new electronic library resources.

Web-based transactions are burgeoning not only because they are convenient, but also because they can be customized. To customize effectively, market segmentation has become a critical sub-trend to address the different and specialized needs of each constituency. This is a trend that is particularly important for multi-type library consortia to consider, particularly when those different types of libraries are of widely different sizes – such as research academic libraries versus small liberal arts college libraries. The needs of, and solutions for, an academic library can often be quite different– from those for a public, school or corporate library. If the consortium is not well-positioned to address the needs of each of its client segments then it will not be able to help its member libraries build a responsive client service programme.

In the Web environment there have been different approaches for a business to meet the specialized needs of Web-based clients. First there were the different home pages for different types of users. For example, when entering a public library Web site, the user could choose from "adult", "researcher" or "high school student", and then get customized home pages to meet the general needs of each client type. More recently has been the development of individual portals, so each user can create his or her own customized view of the site and list their most-used resources. This has been an important evolutionary step in winning the loyalty of customers for the companies that previously provided only search engines– such as Yahoo and Excite. Just as their member libraries have developed portals to their sites, library consortia are also beginning to investigate the value of this customization of their own sites.

Stewart in "The five new rules of the Web technology" captures a number of changes for business brought by the Web - nearly all of which also have the potential for a profound impact on library-based services. One factor in particular warrants attention– transaction processing is being used to handle real-time buying and selling on the Internet. The technology now enables organizations to track the needs of their customers as the customer moves across the Web. Libraries have traditionally done this only at a high level, such as tracking which items are or are not checked out. However, the Web provides the opportunity and the means to measure at a more discrete level the research patterns of individuals and groups. For consortia that maintain union catalogues and shared patron-initiated circulation systems, collecting this type of transactional data are invaluable in developing more responsive systems. Libraries and consortia can use the data to see not only which resources a customer does or does not use. but also how clients use those resources. The latter is particularly important to discern ways to use the Web site to be predictive rather than reactive to client needs.

The Web is becoming a viable alternative to traditional services in business as a result of these trends. Some leading edge companies such as Dell Computers and Amazon do nearly all of their sales through the Web, and other traditional companies are scrambling to keep up with the rapid changes that are occurring. Once unthinkable, libraries that are completely virtual are no longer out of the question. Whether the library is completely or only partially virtual, the development of an effective client service program within this technological environment is going to be quite different from a program that is strictly "building-based."

11.4.15.2. Customer-Service related Trends in Library Services

There are some library-specific, client-service related

trends that are also worth watching. For example, there are some relatively mundane service related statistics and trends worth watching. Although there is not necessarily collective empirical evidence, many libraries are reporting that– the amount of photocopying and the concomitant revenue is going down, but the amount of PC-based printing is skyrocketing. This means that the traditional biggest complaint about libraries - the quality, cost and number of copiers - will slowly decrease, but may be replaced by a new problem. Many libraries have adopted or are moving toward fee-generating networked-based printing solutions to solve this problem. Whether these will increase customer satisfaction remains to be seen, but a new client-service challenge is being created in an area where consortia may be able to provide some effective solutions.

Some of the more interesting customer-service related trends in libraries are reflected in the statistics collected by the Association of Research Libraries. Since 1991, the number of students at these universities has been relatively constant, and there has been a small increase in the average size of library staff. Yet there have been changes in the number of customer-service related transactions. The good customer-service news is that the number of group sessions taught by librarians, and the number of attendees in those sessions, has risen significantly. Additional good news is that the amount of interlibrary lending is up significantly, probably precipitated in part – by the number of patron-initiated circulation systems available.

However, there are some potential trends that indicate that traditional client use patterns are changing. Overall, the number of circulation transactions is down dramatically, perhaps precipitated in part by the increasing use by customers of Web-based information resources. The number of service transactions at the reference desk has declined over the past two years from the high reached in 1996. Based

on median values, in 1997 the decline was 2 per cent, a number that may have been only marginally statistically significant. However, the decline in 1998 from 1997 was particularly precipitous at 14 percent. While there are a number of possible theories for these changes, it is likely that, as Web-based search systems become more intuitive, and more searches are conducted outside of the library building, and as more people attend group presentations, clients are becoming more self-reliant. These changes in use patterns certainly should affect the design and implementation of a client service program.

11.4.15.3. Customer Service Challenges for Libraries

As libraries seek to develop an effective customer service program, there are four key problems they must face: their image; their range of current services; their current and planned use of technology; and the need to retrain their workforce to be customer-responsive.

Image : Libraries have always had a solid and staid image. In this regard, libraries are similar to Brooks Brothers, the conservative men's clothier that was described in a recent article as "... a beloved brand [to which] ... ordinary consumers have an emotional attachment... and do not want to see it change, even if they haven't bought anything there in 15 years". Both share an image in the eyes of some customers that has "devolved into a wayward dreariness". For libraries, any attempts to modernize their image may face some obstacles because, again like Brooks Brothers, libraries have to project "an image of newness and modernity that is at odds with the reality of who the customer is". Consortia that have good marketing efforts themselves may be in a position to help their member libraries to redevelop a new and snappier image.

Services : Library services have been building-based

and with limited service hours traditionally. Most libraries today continue to provide most of their services at walk-up desks located in library buildings. Most services are available only part– of the time that the building is open - and not necessarily the most important times. The services are largely off-the-shelf, with little customization. However, with the trend toward flexible and customized services, clients want their services to be anytime, anywhere services. Consortia may be able to play an effective role for their libraries through the sponsorship or coordination of non-peak hour reference or other assistance services.

Technology : Clients want services that employ the latest technology. A high capital investment to deliver this level of service requires because these services are increasingly expensive to develop and maintain. Many libraries are significantly hampered by having hardware, software, or content resources that are slow and outdated. They are turning increasingly to consortia to provide not only training services so they can keep up with the latest technology, but also consulting assistance or even outsourced support to maintain library system hardware and software installations, Web sites, and digital libraries.

Workforce : Most library staff have significant difficulty dealing not only with the pace of change but also with the vast changes in the content. Librarians and other staff were typically not– trained to meet the demands of the new world in which they find themselves. This creates a substantial disconnect between customer expectations and the library's ability to meet those expectations. The result can be poor customer service. To rectify this problem, intensive and ongoing staff training programs are essential. In addition, the library must hire or obtain – such as through outsourcing, the skills and expertize that are required to provide highly technological services. Consortia are in a good position to

provide not only the training assistance that these libraries need, but also recruitment and retention services to ensure that the libraries are able to hire and keep the best possible staff.

Fortunately, these challenges also provide libraries with opportunities. Within libraries there has been a growing recognition of "marketplace competition" and the need to differentiate their services through market, segmentation. As Web technology matures and becomes commonplace, libraries and their clients will be able to concentrate more on content and less on "basic training" on how to use technology. Another opportunity is presented by the fact that customer service skills are increasingly valued - both by customers themselves and by management. Therefore, a new customer-focused program can be built to address these challenges. Finally, the recent rapid growth of library consortia presents libraries with more partners than ever before to help work through the difficult change management that these new client service programs will rely on.

4.4.15.4. Steps to Develop a New Library Client Service Program

Building an effective customer service program involves common sense, the recognition that effective service is a process and not a product. There are at least eight key steps to building an customer-service program.

- Develop an organizational strategic plan;
- Define the preferred new organizational image;
- Determine the library service plan drivers and objectives;
- Develop and document the customer service plan;
- Train the staff and implement the plan;
- Market the plan effectively;

- Measure the effectiveness of plan; and
- Modify the plan regularly and replace the plan at least every five years.

These eight steps are described in more detail below.

Develop a Strategic Plan : Whenever possible, a customer service plan should be undertaken within the larger framework of a fresh organizational strategic plan. Most strategic planning processes include– an environmental scan of external factors affecting the organization; an assessment of organizational strengths and weaknesses; the development of customer-oriented mission, vision and values statements; and an articulation of new organizational goals and objectives. The strategic plan is vital because it sets the larger context within which the customer service plan will operate. The development of a strategic plan is complicated, and requires a separate and more detailed description than can be provided here, but it is an invaluable first step in developing a customer service program.

Develop the Preferred Organizational Image : The image of most libraries is one of the traditions. It may be that a library wishes to retain this as its customer service image, but more likely today that the library will want to develop an image that exudes innovativeness and technological savvy. The challenge is not to create a complete disconnect from the past, but at the same time to indicate that the library is on the cutting edge of information provision. Libraries do have traditions and strengths upon which we should build and evolve, but which parts of the image should the library retain and which should be curtailed? How does the library build on its traditional strengths and simultaneously project an image that the organization is capable of helping its clients to move boldly into the information future? To build good customer relations the library must build new customers around new products while maintaining a certain comfort level for those

traditional customers who are bound to the old services.

To build a new image even small changes can be meaningful. For example, when Brooks Brothers redesigned their stores they got rid of the desks because "we are greeting people ... [and the] desk creates a barrier". Libraries, which have relied upon reference service desks for many years would be well advised to look at other physical arrangements for their building-based operations. Brooks Brothers also worked to change their image in communications materials. The block-letter logo was scrapped, in favour of a slightly cleaned up version of the old Brooks Brothers script. In the vernacular of logo design, anything that is in handwriting always stands for trust and guarantee. Libraries may well wish to convey their new image by developing a new logo that has a fresh and inviting appeal.

At a deeper level, the development of a new image requires that the library should know how it wants to be seen by its clients. To develop their image, Brooks Brothers employed a technique known as "BrandFocus" - a method that uses visual rather than verbal cues as a means of eliciting from senior managers their feelings about the subliminal meaning of a brand ... (by asking them questions such as). "If Brooks Brothers were a chair, what kind of chair would it be?" Using this technique, the staff was shown various visual images and asked which ones most apply to the organization now, and which the organization would wish to project in the future. Questions were also asked, such as "if this company were a particular product or service – such as a wine, pen, sports team, or newspaper, which one would you want it to be? ... Brooks Brothers (ultimately) ... boiled their brand focus down to seven core attributes: distinctive, correct, casually elegant, genuine, eclectic, smart, and sexy".

If libraries were to use the BrandFocus technique, which products and images would best describe the library? What

core attributes would best describe the customer service focused library? Perhaps this statement about Brooks Brothers would resonate with many libraries: "It was not really about change ... It was like ... a beautiful house, but it needs tender loving care: new plumbing, new windows."

Determine Organizational Drivers and Objectives : A related question to image is which factors should drive the organization and its objectives for the future? For example, should the library use the customer service program as a means to introduce new programs or services, or largely to improve existing ones? Should the program be used to undertake active and innovative approaches, or simply to document the services that are available currently? Should the library seek through the program to give customers what they already have, or what they want? Does the library want to develop customized services and solutions, or to achieve a better balance between customization and standardization?

Develop and Document Customer Service Plan : Ideally, an early step in developing a new customer service plan is to establish the level of current customer satisfaction and to assess the current quality of services. As Hernon and Altman observe, "library quality and service quality are very different measures". It is possible for the quality of service to be relatively low and satisfaction still high, or for satisfaction to be low even when the quality of service is high. For example, the latter could occur when the organization is providing a quality service that no one wants. Therefore, it is important to establish how satisfied customers currently are with the service, and to ascertain the level of excellence of current services. Both require both qualitative and quantitative measures to be established, and then the current services tested against those measures. Specific elements involved in the preparation of the plan include the following:

- Establish Benchmarks : Establishing benchmarks

about current services enables the library to measure its progress or reduction in quality of service or satisfaction. To generate the benchmarks, the library should gather meaningful data and customer input through surveys, random samples of work products, and focus group interviews prior to undertaking the launching of the customer service program.

Another way to establish a benchmark is to ascertain the current "best practices" in the profession. Who are the leaders to whom the library would ultimately like to compare itself? The best practice leaders may not be libraries at all, but may be leaders in the information industry, in bookselling, in publishing, in telecommunications, or some other field. What practices make these organizations the leaders in their industry? Are they particularly efficient or effective? Are they widely respected for the level of their customer satisfaction? The benchmark establishes what is currently being done to establish best practices what should be done.

- Develop the Plan : Once benchmarks have been established, the next step is to develop the customer service plan. It is important for the library to distinguish between the broader customer service plan and the more focused, but critically important, customer service statement. The latter outlines for customers the services that the organization will provide and the proposed levels of quality to which the organization plans to adhere. It is a pledge to provide service. By contrast, the plan is a broader and comprehensive set of actions that the library intends to take, and it outlines who will be responsible for accomplishing each task, how those tasks will be established, and what will be the expected date for accomplishment.

- Seek Staff and Client Input : In developing the customer service plan, it is important to seek a wide range of input, both from the library staff and from the various client groups. Staff input is important not only because the staff are well-informed about current and proposed practices, but also to ensure that staff ultimately feel invested in the new program. Client input is critical because ultimately it is the client for whom the plan is being developed.

- Prepare the Customer Service Statement : A critical component of the plan is the customer service statement. The statement often consists of two parts–a general pledge for service, followed by more specific and measurable objectives. For example, the pledge might state "we will provide prompt and courteous service at all times to all clients," while the latter could give the pledge specific meaning though statements such as "we will acknowledge you immediately at our service desks and assist you within three minutes." This specificity is what will make it possible for the library to monitor the level of success of the organization in meeting its customer service commitments.

  During the time when the customer service statement is being developed, it is important to recognize that the process can be as important as, if not more important than, producing a final published document. It is through this process that what matters most to the library will be clarified through a number of iterations of the statement. Since the staff will be so involved it is important early on to establish some ground rules for the process. For example, staff input should be sought on the content of the document, but one person should be empowered to complete the final editing. Another ground rule might be that the input should be about the services, not the organization chart, so that new and

emerging services do not get forgotten because they are not yet embedded in the current organization.

An important key to the process is to avoid relying on statements prepared by other libraries. This is a good time to reinvent the wheel. By starting with other libraries' statements, a library is likely to forget services that are uniquely its own, or to eliminate services from consideration simply because they did not make it into another library's publication. This part of the process is particularly critical if a library consortium is trying to establish a common process that the member libraries can follow. While the process may be similar from library to library and the ultimate statement may bear similarities, the consortium should not attempt to impose too much rigidity or to create a one-size-fits-all kind of template that each library mindlessly completes.

It is also important to establish deadlines for completing the process, and adhere to those deadlines. This is a process that can become endless unless someone holds everyone's feet to the fire. If the consortium is providing the leadership for the process, this will also prevent the consortium from getting stuck with a far greater - and longer - task than it originally intended.

Although internal discussions should document all services that are provided directly and indirectly, the final published public document should include only those services that are of greatest interest to most clients most of the time. The library may also wish to employ market segmentation and publish separate statements, with different objectives and measures, for different clientele. For example, an academic library might: publish separate statements for faculty and students, and a public library may want separate statements for children and adult services.

Whatever is included in the published statement should be written from the perspective of the customer, not of the library staff. This means not only eliminating library jargon, but also considering how the staff would like to be treated if they were the customer.

Probably the most critically important factor is to ensure that to the greatest extent possible all statements should include specific qualitative and quantitative measures of performance. Stylistically, each statement should be brief and to the point. Resist the temptation to use "waffle-wording" - ambiguous statements that begin with words such as "usually" or "generally." The statement should provide measures of results, not of the processes followed, and the goals should stretch the organization to do more than it may be doing currently. Nonetheless, the library should avoid the temptation to promise more than it can reasonably deliver. Clients will be more impressed if you under-promise and over-deliver than vice-versa.

- Staff Training : After the statement is written, an essential step is to train the staff about the plan. Although the staff should have been involved in the preparation of standards, especially those within their own areas of responsibility, this may be the first time that all staff will have an opportunity to see the plan in its entirety, so it is important to explain all of the standards, their purpose, and the organizational expectations. This is also an opportunity to provide reassurance to the staff that the standards are being used to help the organization grow, not to put staff performance under a microscope.

  The success of the entire effort will depend upon the quality of the training, so it is important to execute it well. When possible, assuage staff apprehensions by

using reason and humor. Consortia can be particularly helpful in the training process. Staff need to be trained both about the specific requirements contained in the library's customer service plan and in good general customer techniques, such as telephone and service desk demeanour. This general training may be developed for different levels of staff, from volunteers and student assistants through professional staff. The consortium can develop a solid program in these techniques, and offer such training to new staff on an ongoing basis.

- Follow-up : Effective follow up is a critical element in training. After the plan has been in effect for about a year, the library should plan to measure group performance against the objectives set forth in the plan. This should be done using a variety of techniques that will be described later in this paper. Although it is best not to measure individual performance against the plan in the first year of operation, having allowed an ample "grace period" the library should consider incorporating into annual performance appraisals how well each individual advances the objectives of the plan.

Implement the plan : With the plan in place, it is important that the entire client community understand that the customer service program is one of continuous improvement, not a quick-fix that will yield immediate results. The management of the library should seek the understanding of those above them – such as the university vice president to whom the library reports, that the library should be rewarded for undertaking this effort rather than be singled out for scrutiny. A customer service program needs adequate time to grow - at least three-to-five years - and administrative support during this time is crucial. Again, library consortia can play a critical role. As an outsider to the local process, the consortium may be able to provide objective information

that can help the library's sponsor to understand that customer service plans are a means of growth, not a product to be purchased.

Marketing : To implement the plan, the library should publicize it well. Consortia can be helpful by providing ideas for creative marketing, and perhaps by developing standard marketing programs that each member library can adapt for its own use.

Obviously, the key purpose of marketing is to make the audience aware of the programs and services included under the customer service program. The first marketing efforts should concentrate both on traditional communications media, such as print brochures and library newsletters, and on using electronic measures, such as listservs and highlighting the program on the library Web pages. In every presentation, the library needs to add some snap to help project its new image.

For key clients – such as faculty, the library should consider not only distributing information in print but also having visits in person, whether through group visits or personal phone calls. The library should not worry about over-saturating the market with the message. It is far more likely that most clients will still be unaware of the program six months after implementation than that they will be sick of hearing from the library about new innovations.

The publicity developed should incorporate the principles of the plan throughout the organization, its services and operations. For example, the library Web site should be revised to include a copy of the statement itself. The content of the Web site should also be updated to be consistent with the objectives of the customer service plan. For example, if one aspect of the plan is to solicit continuous customer feedback, the Web site might be revised to include not only online suggestions but also the library's response to all

questions posted on the site. A customer service program is doomed to failure if the clients of the library do not know about or understand the program. A key element in implementation is the creation of a business or marketing plan, including the establishment of the objectives of the marketing plan and assessing costs for implementation. Examples of objectives include whether and how to market to different market segments, or what image the library wishes to project about itself and the program.

Measure the Effectiveness of Plan : The importance of establishing benchmarks to the effectiveness of existing customer services is crucial. During the first year of the program it is important to develop regular feedback mechanisms to enable the library to monitor regularly the progress against the customer service program goals. Consortia can also be helpful in this follow-up stage by standardizing, collecting and providing comparative benchmark data from other member libraries. By reviewing its own data within this larger context, each library can gain a better sense as to where it ranks in terms of its rate of progress.

There are a variety of means for the library to ascertain its effectiveness. Although client surveys are often employed to gain direct customer feedback, surveys have distinct limits. First, surveys are often done poorly because they fail to observe the precepts of survey research and random sampling techniques. Furthermore, to be effective surveys must be short enough so that clients are willing to take the time to complete the survey. However, by limiting the length the library limits the extent and nature of the feedback. For this reason, surveys are a good tool for gaining feedback at a broad level, but they will not provide a highly granular level of information. Surveys can best be used in conjunction with other techniques, such as focus groups, which can provide more in-depth information on topics of particular importance

to the library. If the customer service improvement program is being developed by the consortium, a standardized survey can not only speed the process but also help to provide some comparable results.

One particular useful technique for customer service program evaluation is to review system logs of customer transactions to intuit search patterns and resources of interest. The new Web-monitoring tools and other software to maintain client histories can be very effective in tracking customer behavior and compiling useful statistical information about current client needs. This may require upgrading the library technology infrastructure, but Web monitoring tools can be fairly inexpensive and very effective. For privacy purposes, if tracking software is employed, it is essential to do so in a way that the logs do not: identify the names of specific clients.

Some less formal ways to gain direct customer feedback include print and online suggestion boxes and unsolicited testimonials from clients. These can provide effective means of recognizing good performance or addressing customer complaints quickly and fully. It is also important to measure the effectiveness of current internal operations such as the quality of the library stack maintenance program. A particularly valuable technique is through random sampling of work - both as it occurs and after the fact. For services such as reference, unobtrusive techniques can be used, such as observation of transactions. Perhaps more controversial, but still viable, is to hire an external agent to pose as clients to ask questions, and then to judge the effectiveness in terms of response time and accuracy of response.

It is more important when gaining feedback to be able to distinguish feedback from noise. In an information environment that is heavily reliant on technology, it is noted that it is important not to mistake the customer for the market.

Ultimately the service providers "that overemphasize the importance of the customer-listening process are frequently those that trail the market and come up short on winning ideas for next-generation products ... Telling customers that 'we listen to you' may be flattering, but it often is a cover-up for a vendor that has lost its inspiration and its way."

Modify the Plan : The final step in the process is one of renewal. Annually, the library should review its plan, the customer service statement, and its progress. The library should make revisions and modifications to the plans and statement based on the reviewes. More importantly, every five years or so the library should scrap the plan entirely and start over. Why not build on the existing plan? For the same reason that the library should not simply copy another library's service plan– the tendency to forget things that should be included. Furthermore, there will be changes in approach and in technology that the library should consider but may forget - by simply following the annual add-on process indefinitely. For example, five years ago the Web was new, but today it is ubiquitous, so the customer service expectations should be different. Similarly, a plan from three or five years ago might have emphasized the quality of photocopier services, but ignored the demands for PC printing. How different would your library's customer service plan be today if it were to continue to rely on the technology as it existed five years ago?

11.4.15.5. Role of Consortia in the Development and Implementation of Library Customer Service Program

There are many ways that a library consortium can play an invaluable role in developing and helping libraries to implement new customer service programs. In addition to those ideas mentioned above, there are at least two ways in which library consortia can help. The first is to support library change management programs related to customer service

improvement, and the second is to help improve the services themselves.

Change Management : There are a variety of steps consortia can take to advance library change management. Library consortia can develop standardized customer service delivery programs. This would save the libraries from having to develop each program from scratch, and consortium members could derive benchmark data after the program has been implemented. Consortia can also provide training programs to assist libraries in the development of customer service programs, and on techniques for staff to practice for good customer service delivery.

Innovative technology is another way in which libraries can improve their customer service, and there is a definite role for library consortia to play. Especially with the integration of library and computing service desk operations, more libraries are implementing "help desk software" to enable the library not only to track customer calls, but also to develop a database of questions to common answers and to generate statistical profiles of client transactions. There are a number of help desk software packages on the market, but local implementation of the software is complicated. Consortia can assist in this process both by reviewing software options and providing libraries with alternatives to consider, and by acting as software implementation partners to speed the implementation process.

Another potential technology-related role for consortia is Web site development and management. The Web has clearly become a major tool for providing direct services to clients. However, some libraries may not have sufficient on-staff expertise to mount the most effective possible sites. Graphic design, content development, site organization, and technological capabilities such as Java applets or portal design all require different expertise that a single library Web

master may not have. Consortia can play a valuable role, either by training their members about the technology or possibly by serving as an outsourcing agent to provide high-quality Web sites for those libraries that cannot or do not wish to perform this task in-house.

A growing area of importance in service delivery is the process of hiring and retaining staff who will have effective customer service skills. There is potential here for consortia to provide professional recruitment services for libraries to help relieve the libraries of the burden of identifying and attracting appropriate candidates when vacancies occur. Consortia can also help libraries to develop good staff performance appraisal and retention processes; for example, the library could provide workshops on conducting effective evaluations of both individual and team efforts, and to develop good team management skills. Consortia can also serve as a clearinghouse or as a sponsor for library staff exchanges and to develop mentoring programs. Such programs can provide opportunities for library staff to learn first-hand about effective service delivery.

Finally, consortia can help libraries to improve their operating processes, and thereby improve the ultimate quality of the services that are provided. Many consortia are in an excellent position to provide objective assessments about current library processes and operations in cataloguing, acquisitions, circulation, technology, or reference services. The consortium can provide detailed analyses of how to make the operations more productive. This can result in better production rates and in cost savings that give the library money to reinvest in other client-related services.

Service Improvement : Consortia can help libraries to expand their service offerings and to do so at a lower cost to help to improve the services that libraries offer. For example, many consortia are already negotiating site licenses for

consortial purchase of electronic resources. An emerging area of interest is the development of library and regional digital library programs and services. Consortia can serve not only to provide training for libraries interested in developing digital imaging services, but also can serve as an outsourcing agent that would generate the images, create the searchable database using standard technologies, or mount and maintain the Web site.

With the growth of anytime and anywhere Web-based services, libraries are increasingly being expected to provide customer assistance at non-traditional hours. Ideally, a library should be able to provide telephone, e-mail, or interactive chat assistance to their clients 24 hours per day, seven days per week. However, to do so may be expensive, and many libraries cannot afford to provide this service if there is a low number of callers. By combining the transactions of multiple libraries in the consortium it may be practical to achieve an economy of scale to answer at least the most common questions. When combined with the knowledge database that would result from the help desk software described above, the consortial service could not only answer more questions but also log questions that could not be answered immediately but would require further action the following day.

There are, of course, many other ways in which consortia can provide services to libraries that will directly and indirectly result in customer service improvement. The consortium could provide a common ground delivery system for rapid interlibrary lending, develop a common solution for collecting fees for printing at PC workstations in the library, or develop a consortial curriculum for an effective information literacy program. These are all illustrative and not exhaustive examples to demonstrate that library consortia can and should play a vital role in helping libraries to deliver quality services to library clients.

Libraries today are facing unprecedented challenges not only to provide customer-responsive services, but to do so in the face of constant change. By working with their consortia as strategic partners, libraries can find highly effective solutions to help them to answer the riddle of customer services.

11.5. CONSORTIA DEALS IN INDIA

India does not have a very rich tradition of consortia arrangements or resource sharing amongst libraries. So far the Indian libraries are faced with several environmental circumstances – cultural, economic, political, etc., that are unique to India. But in 1990s, the emerging change in publishing industries and phenomenal increase of web-based resources as well as other organizational imperatives, perhaps forced the Indian libraries to move towards a strategic partnership - as a measure of last resort. Therefore, a few efforts have been made in different levels to provide shared web-based electronic resources amongst the research, academic, and technical libraries in India. Such major initiatives are; J-GATE (JCCC) from Informatics India, IITs-BARC-TIFR Cooperation, TIFR Libraries Consortium, ISI-Library Consortia Deals, SNDT Consortia of LISA, STI Network, FORSA Libraries Consortia, ICAST Consortia, IIM Libraries Consortia, INDEST Consortia, CSIR Consortia, HELINET Consortium, VIC Consortium of ICICI-Knowledge Park, ISRO Libraries Consortia, and INFLIBNET consortium under UGC InfoNet. It is worth to mention here some of the initiatives listed above could not materialize properly and beyond their success. Still the library professionals in India like to believe that their consortia initiatives seem to have bright future, and hoping to have more members to participate. Therefore, newer initiatives are being organized over the years and steps are being taken to organize many more. Previous experiences will no doubt help in making the idea

of consortia more widespread and in their successful implementation.

After launch of the Indian National Digital Library in Engineering Sciences and Technology (INDEST) Consortium in 2003 and UGC-INFONET Digital Library Consortium in 2004, availability and accessibility of e-resources increased phenomenally in centrally-funded technical institutions (IITs, IISc, IIMs, IIITs, etc.) and universities, setting in a new culture of electronic access and browsing in academic institutions. Besides, INDEST-AICTE Consortium and UGC-INFONET Digital Library Consortium, a number of other library consortia have emerged in India in the past five – six years. These include Department of Atomic Energy (DAE) Consortium, CeRA (Consortium of e-Resources in Agriculture), Health Science Library and Information Network (HELINET) Consortium, Defence Research and Development (DRDO) e-Consortia, Department of Biotechnology's DeLCON, and Electronic Resources in Medicine (ERMED) Consortium.

Some of the notable Indian initiatives on library resource sharing utilizing the internet technologies are shown in Table 11.1. Some of the above and other important library consortia are briefly discussed here.

11.5.1. J-GATE from Informatics India

J-GATE interface, launched by Informatics India, proposes to serve as an electronic aggregator, third-party gateway and electronic archival facility for several thousand scientific journals. It hosts a large database consisting of bibliographic references and abstracts of journal articles, with links to their full-text articles at the publisher's site. It also provides online full-text access to journals articles, over subscription. In that case user's authentication based on IP or Password will be done by the J-GATE interface. Importantly it facilitates and initiates towards the formation of

Table 11.1. Major Ongoing Library Consortia

Sl. No	Name	Participating Libraries	URL	Resources	Amount Rs. in Crores
1	UGC INFONET (INFLIBNET)	160 University Libraries	http://web.inflibnet.ac.in/info/ugcinfonet/ugcinfonet.jsp	1. 5790 E-Journals 2. 10 Databases 3. JCCC	30
2	INDEST (MHRD)	120 (38 MHRD Institutes + 82 others)	http://paniit.iitd.ac.in/indest/	1. 12000 E-Journals 2. 6 Databases 3. JCCC	24
3	FORSA (Astronomy/ Astrophysics Libraries)	11	http://www.iiap.res.in/library/forsa.html	1. 25 E-Journals 2. Nature 3. Journals	Not provided
4	DAE	50	http://www.tifr.res.in/~libws/	1. 1600 E-Journals	2
5	CSIR	40	http://www.niscair.res.in/ActivitiesandServices/MajorProjects/majproj.htm#ejournalconsortia	1. 3100 E-Journals	25

6	ISRO	12	Not provided	1. 900 E-Journals 2. JCCC	Not provided
7	IIM	6	http://www.iimahd.ernet.in/ http://www.iimb.ernet.in/ http://www.iimcal.ac.in/ http://www.iimidr.ac.in/ http://www.iimk.ac.in/ http://www.iiml.ac.in/	1. 1050 E-Journals 2. 6000 Aggregated Titles 3. 12 databases 4. JCCC (4271 Journals)	5 (partly funded by INDEST)
8	HELINET (RGUHS, Karnataka)	26	http://www.rguhs.ac.in/ hn/ne whell.htm	1. 600 E-Journals 2. JCCC	2
9	ICICI Knowledge Park	7	http://www.iciciknowledge-park.com/	1. 500 E-Journals 2. JCCC	Not provided, funded by NISSAT
10	ICMR	24	http://www.jccc-icmr.informindia.co.in/about/about.asp	1. 693 E-Journals 2. JCCC (11800 Journals)	Not provided

consortia of libraries by bringing subscribers of journals from a given publisher together. For example, Informatics India with initiation from three different educational institutes has successfully developed three consortium models. These are;

- SNDT University consortia of Library and Information Science Abstracts (LISA) with other six universities,
- FORSA (Forum for Resource Sharing in Astronomy and Astrophysics) consortia of Kluwer E-journal consortia program with five institutes, and
- IIMs consortia of 33 Kluwer journals in management sciences.

11.5.2. Agreement of Co-operation amongst IITs, BARC and TIFR

The idea for a consortia of IITs in India was first mooted in 1995 in an annual meeting of IIT Librarians at IIT Bombay for subscribing the printed journals. The librarians of Bhabha Atomic Research Centre (BARC) and Tata Institute of Fundamental Research (TIFR) also participated in the meeting. Although rationalization of periodical subscription in the printed format had limited impact, it did trigger a highly active resource-sharing programme amongst IITs, BARC and TIFR in India. However, in subsequent annual meetings of the IIT Librarians, decision for consortia-based subscription of electronic journals was taken and an "Agreement of Co-operation" was signed to realize the goal. The consortia of libraries of IITs, BARC and TIFR tried working out consortia-based subscription to electronic journals through a number of publishers including Elsevier Science (Science-direct), John wiley (Wiley interscience), Springer Verlag (Link Information Services), and Academic Press (Project Ideal) for the year 2000, but without much success. Still the Initiatives are being taken for the subsequent years, obviously minimizing the negative aspects experienced in previous years.

11.5.3. TIFR Libraries Consortium

TIFR Library, Mumbai, took a resource sharing initiative in 1999 among its five centers and six field stations libraries of the 'Institute'. These centers (HBCSE, NCRA, CML, NSBS, and TIFR Bangalore Center for Mathematics) and field stations (HEGRO, GMRT, CRL, RAC, Gravitation Laboratory, and Balloon Facility station) are the constituent part of the TIFR Institute. Initially they started consortia-based subscription from AMS (MathSciNet) & Springer LINK (unlimited access to 250 titles on Computer Science Life Sc, Math, Phyircs & Astronomy), for limited centers. Subsequently they increased the co-operation and now they have several consortia-based subscription of electronic resources, as shown in Table 11.2.

While the TIFR members are experiencing with some common problems such as of *location, funding, negotiation, access to achieves, cancellation of print subscription,* still they like to believe that their consortia initiatives seem to have bright future, and hoping to have more members to participate.

11.5.4. ISI Library Consortia Deals

Consortia based subscription of electronic resources in the Indian Statistical Institute (ISI) Library, Kolkata, was first mooted in 1999. Primarily it was initiated by Mr. C. Bhattacharyya, the then Chief Librarian at a meeting of the Library Committee in the presence of the member coordinator, National Board of Higher Mathematics, DAE, GOI, held at ISI Library. The initiative came into existence with a consortia-based subscription to MathSciNet database, and the agreement was signed on 29th November 1999. By this agreement, the AMS grants a license of access to MathSciNet on web, subject to the terms and conditions agreed between the AMS and participating consortium members. MathSciNet is a comprehensive web accessible database of mathematical

Table 11.2. Overview of TIFR Libraries Consortium

Online Resources	Present Status of the Resources	Consortium Started	Consortium Members	Impact
AMS MathSciNet	No of records: 1.9 million approx Archives: 1940+	1999-	TIFR-Mumbai, CML-Pune, & TIFR-Bangalore Center	Low cost (fee reduction based on Mathematical Activity of the institute).
Springer LINK	No of titles: 250 approx Archives: 1996+	2000 -	TIFR-Mumbai, & All TIFR Centers & Field Stations	More resources & Unlimited access, Price negotiable.
Elsevier Science Direct	No. of titles: 1 500 approx Archives: 1995+	2002 -	TIFR Mumbai & All TIFR Centers & Field Stations. (As part of DAE Consortium)	More resources & unlimited access, access to archives, 5 percent price cap for print, 42 discounted journals available.
BioMedNet	No of titles: 25 Archives: 1995+	2002 -	– Do –	Package subscription & Based on print subscription on negotiation.
Cell Press Online	No. of titles: 8 Archives: 1996+	2002-	– Do –	Package subscription & Based on print subscription on negotiation.

literature throughout the world, published by the AMS, Providence, USA. It is worth noting that the ISI is an autonomous institution under the Ministry of Statistics and Programme Implementation, Government India. However the 'Institute' is also functioning as the Eastern Regional Center for NBHM due to its outstanding contribution in mathematical research. Therefore, the ISI Library is partly funded by the NBHM grant. of MathSciNet along with its print version of Mathematical Review, is one of the NBHM granted subscriptions. Anyway, the 'MathSciNet Consortium' was established in association with several other institutes, universities, and learned societies from northern and eastern part of the India. Primarily, it was intended to enjoy the pricing benefits and to serve the member institutions, desire for the same subscription but having relatively limited budget. Now it has got much recognition and the arrangement has now received wide spreads. More than 18 members has come under this Consortia, which includes S. N. Bose Institute of Basic Sciences – an organ of CSIR at Kolkata, University of Calcutta, Jadavpur, Kalyani, North-Bengal, Burdwan, Viswa-Bharati – from West Bengal - east India; Utkal University Sambalpur, from Orissa; University of Guwahati, Assam, Manipur, Tezpur – from northern part of the country, etc. and even Calcutta Mathematical Society becomes a constituent member of this consortium.

The ISI Library initiated another idea under the chairmanship of Professor D. Dasgupta, which was implemented in 2003. Basically the 'initiative' was considered as a measure of duplicate or even triplicate journal subscription, simultaneously made by two branch libraries of ISI at Delhi and Bangalore, which made little economic senses and consumed excessive library space. Several discussions were made in this direction. Ultimately an arrangement of consortia-based subscription to Science-Direct – a division of Reed Elsevier Inc., was made with the Elsevier group of

publishers, and a "License Agreement" was signed between the two parties. The agreement offers, a platform fee of 9 percent of the print cost, and content fee – based on print subscription, so as to provide unlimited access to more than 1500 titles from Elsevier group of publishers (ES, AP, NH, Pergamon, Excerpta Medica, etc.) with excellent search facility and access to archives. It included online full-text access to Elsevier journals over print subscriptions made by any of the three centers of ISI along with the complementary access to other centres. Additionally it provides online-full-text access to 48 journals – as selected by ISI faculty members from the Elsevier group of titles, in order to realize the amount of duplicated/ triplicated print subscriptions within three centers. Access to full-text journals is equally applicable to all the centers as mentioned above and in all the cases – print and exchange, back-files are available since 1995. Even the agreement allowed limited download of full-text articles for academic use. This negotiation offers a maximum 6 percent price cap for print subscription for subsequent years, up to 2005. This license was renewed in the year 2006 with modest benefits.

ISI Library has another Consortia-based subscription to EconLit database – electronic version of the *Journal of Economic Literature,* published by the American Economic Association, which is started in 2003. ISI-Delhi Centre and Assam University, Guwawati University, and Tezpur University are the constituent members of this consortium. Users can simultaneously access (one/ two) the 'Database' from their sites using authorization and password. This consortium did not have much recognition and coalition stopped in the year 2005. Meanwhile, different publishing groups made several demonstrations but the consortia subscriptions are not of immediate interest to ISI. All the above-mentioned initiatives will have great potential impact on ISI library services for the foreseeable future. However,

Consortia subscription for AIP, Wiley-Interscience, ACM Portal, SIAM Journals, JCCC, PubMed, Emerald publications, etc is yet to be initiated by the ISI Library. Recently the ISI Library has become a member of the INDEST for the subscription of IEEE's Electronic Library (IEL) and also formed a consortium for Springer-Link among the three centers. Importantly, the ISI Library is required to gear up the consortia based subscription of electronic resources and should pursue for the induction to possible members of ISI consortia initiatives.

11.5.5. Forum for Resource Sharing in Astronomy & Astrophysics (FORSA)

It became into existence in the year 1982, for sharing the resources available in astronomy libraries in the country. The list of institutions are the members of this forum, viz; Indian Institute of Astrophysics (IIA)-Bangalore, Inter University Centre for Astronomy & Astrophysics (IUCAA)-Pune, National Centre for Radio Astrophysics (NCRA)-Pune, Physical Research Laboratory (PRL)-Ahmedabad, Raman Research Institute (RRI)-Bangalore, Tata Institute of Fundamental Research (TIFR)-Mumbai, UP State Observatory-Nainital, and Nizamiah Observatory-Hyderabad, It has been reported that the FORSA Consortia to become a member of ICOLC. IIA Library will be taking up the issue.

The FORSA members concluded a consortium deal with Kluwer publishers for cross e-access to 23 Astronomy journals for the last two years. Electronic access to "Nature" journal is also being available through this Consortium deal, for the last one year. The Consortium offers for the AIP journals and MNRAS (Blackwell) is being considered by the FORSA members for the year 2004. Few member libraries of FORSA have merged their books catalogue using LIBSYS software, and the access to this merged database is available at http://www.rri.res.in/htmls/library/forsadb.html.

FORSA National and International activity includes, Round table on Consortia Models in India, Workshop on Consortia, Conference on FORSA at LISA IV, etc. FORSA meets in a regular basis and in a meeting held during the Workshop on Forging Collaborative Partnerships–Consortium of Libraries of DAE Institutions and FORSA Member Libraries Meet, July 28-30, 2003 at TIFR Mumbai, following discussions were made : Consortia subscriptions for IOP, MNRAS, Science, Taylor & Francis, Springer Link, John Wiley are not of immediate interest to FORSA. However, Consortia subscription for Nature & AIP is being considered. It was also decided that additional member institute libraries could be invited to join FORSA provided an Astronomy research group exists in the institute.

11.5.6. IIM Libraries Consortia

Indian Institutes of Management are premier national business management education set up by the legislation of government of India. The major objective of the institutions is to train young graduates to become professional managers. To achieve the objective each IIM set up libraries to support teaching, learning, research and other consultancy activities of the institutes, now all of them are fully modernized. The concept of IIM Library Consortium has been floated a few years back, when the IIMs Librarians felt to interact on the possible sharing of their subscribed digital resources, and a pilot study was conducted to identify the currently subscribed digital resources among the IIMs. Subsequently the IIMs Directors, in a meeting held at IIMK during August 2001 approved the formation of the 'Consortia' and encouraged the librarians to actively participate for mutual benefit.

Accordingly, the Librarians jointly identified the consolidated electronic resources, which will be of great relevance to the IIM community and invited the major publishers/ vendors of databases, journals and other value

added service providers. Naturally the publishers/ vendors enthusiastically responded to the invitation, even they made their presentation along with their competitive offers for the consortia. In some cases they offered at drastically reduced price – as much as 40-45 percent discount, provided all IIMs subscribe to the same resources, viz. ABI/INFORM-fulltext, Business Sources Premier, Gale Products, Global Marketing Information Database, etc; and other resources, viz., EBSCO-BSE, EconLit-Ovid, CAPITALINE, INDIA INFORMER, etc. were priced in a rational way.

Therefore, being a closed proposition, IIM Consortia identified two areas for partnership viz, developing the collection on shared basis, and developing the services exploiting such a collection. The consortia envisaged the operating principle of decentralized acquisition, decentralized processing and centralized utilization and access. In reality, they successfully executed a few shared acquisition services viz, Science Direct of Elsevier, John Wiley electronic journals, and Kluwer electronic journals, Proquest and EBSCO services. More areas are identified for partnership. Now the IIM Library consortia have their success for partnership.

11.5.7. CSIR Consortia

It is a consortium for CSIR Laboratories for accessing e-journals. The Council of Scientific and Industrial Research (CSIR) in India has 40 scientific laboratories involved in basic and applied research in various disciplines. Many of the laboratories have well equipped libraries, and some of them act as the main information centres in different subjects functioning as consultant libraries at the national level. Access to electronic journals through the use of state-of-the art technology is possible in many of the libraries belonging to these laboratories. Each of the laboratories have a well established library or documentation centre that is also backed up with strategic information support from the National

Institute of Science Communication and Information Resource (NISCAIR), a constituent establishment of CSIR formed with the merger of INSDOC and NISCOM.

Fig. 11.2. Snap Shot of CSIR Consortia

To augment CSIR research and development activities, NISCAIR implemented agency for the process of providing access to globally available Electronic Journals to entire S&T staff of CSIR and its constituent units through a consortia approach. As a first step, in recent past NISCAIR on behalf of CSIR has entered into an agreement with M/S Elsevier Science to access its odd 1,500 e-journals and further intends to strengthen its information resource base by subscribing e-access of more and more journals published globally. CSIR consortium has also extended its access by creating appropriate agreements on consortium basis with the other providers of E-journals.

11.5.8. ICAST Consortia Initiative

The Information Centre for Aerospace Science and

Technology (ICAST) is an organ of the National Aerospace Laboratories, a CSIR Laboratory located at Bangalore. ICAST is established in the year 1959, which caters to the information requirements of the Indian aerospace community in particular and the engineering and technical personnel in general - thus fully justifying its recognition as a National Information Centre by UNESCO, DSIR and AR&DB. ICAST is well known for its aerospace collections of books, journals, and specifically technical reports from NASA, DLR, ONERA, NLR, ARL and UTIAS. It is acting as repository centre in the field of aerospace and related areas – aeronautics, aerospace engineering, computer science, composites, metallurgy, mechanical engineering, material science, mathematics, etc., for providing specialized information services using various sources of information in electronic/print media and adopting developments in Information Technology for making services much more effective, exhaustive, dynamic and almost instantaneous. The Centre also offers online, CD-ROM and Internet based literature search services and is equipped with the necessary infrastructure and trained manpower. The centre has created during 1998-1999, a portal called 'AeroInfo' (http://www.aeroinfo.org.in) - a worldwide gateway for Aerospace Science & Technology, the first of its kind in the country, which serves as single point information search facility for the entire aerospace community in the world in general and India in particular. This site gives direct links to Science Direct, J-Gate, and Annual Reviews of Fluid Mechanics and Materials Science. It also gives access to the Union Catalogues of holdings of NAL, IISc, RRI and the union list of current journals from 1997 onwards, subscribed in 16 major Aerospace & CSIR libraries.

For campus-wide access to international databases in Aerospace and Material Science (CoMSAC), ICAST took the initiative to form a 'Consortia' of like-minded libraries to provide seamless and cost-effective web-based access to renowned

international databases hosted by the Internet Database Service of Cambridge Scientific Abstracts (IDS/CSA). Scientists from all the three campuses at Belur, Kodihalli, and C-CADD/ CMMACS could access 12 bibliographic databases round the clock. Its website is http://www.cmmacs.ernet.in/nal/picts/divar01/icaar01.htm.

ICAST organized a one-day meeting of Heads of Aerospace Libraries on 7th May 2002 at Director's Conference Hall. More than 30 participants from various organizations including ISAC, HAL, ADA, ADE, CEMILAC, GTRE, VSSC, SHAR Centre, NRSA, SAC, MCF, IAM, RRI etc. attended the meeting. Mr. I.R.N. Goudar, Head, ICAST stressed that the contemporary IT developments and emerging knowledge-bases must be exploited for the benefit of aerospace community. Dr. T.S. Prahlad – NAL's former Director, in his presidential remarks said that collections must be strengthened based on the thrust areas of the institution concerned. The emphasis is also given on networking of Aerospace libraries.

11.5.9. ISRO Libraries Consortia

The Indian space efforts started in sixties with the establishment of Thumba Equatorial Rocket Launching Station. Thereafter, the Indian Space Research Organization (ISRO) was established in August 1969 with the objective to develop space technology and its application to various national tasks. Over the years, Dept. of Space (DOS), Govt of India has built up a strong research, development and technology base with necessary infrastructure along with the library facilities for implementing the space programme through various space centres, viz. ISAC, VSSC, SHAR, SAC, LPSC, ILHP, DECU, ISTRAC, MCF, IISU, NRSA, PRL, NFRF, RRSSC, NE-SAC, etc. All these centers are equipped with a good library, which plays a vital role by providing various sources of information to materialize the activities of those

centers. In recent past, like other libraries, ISRO libraries have faced the unending fiscal constraints and several attempts/ strategies have been made in this direction. They are combating the fiscal constraints by canceling the costly and less used journals and are trying for cooperative acquisition in the way of collective decision making. As many as 252 costly journals (>$ 500) worth Rs. 50 lakhs were cancelled by ISRO Satellite Centre (ISAC) library during 1989-2002. Therefore, they realized to make the savings, taking the advantage of changed pricing policies of publishers of concessional rate for multiple copy subscriptions and complementary e-access to other sister organizations, coupled with the availability of new media of information resources like e-joumals, CD-ROM, etc. Efforts were put into implement uniform library management software to enable remote networked access of holdings of about a dozen libraries within the ISRO.

In view of the above purpose and with the encouragement of top-level management an effort is made to develop a practical agenda for their entire group of libraries to increase the savings, without any reduction in services to the users. They have raised the issues on - costly journal subscriptions, combined/ membership subscriptions, package deals, non-overlapping subscription to exceptionally priced resources, sharing complementary access to e-journals, standing orders, etc. Assumed the responsibility of main centre, ISAC-Library circulated the agenda among librarians of major centres during April 2001 seeking specific data about journals, CD-ROM databases, package deals, and standing orders. Using ABC analysis on the data initially gathered from four major libraries, namely ISAC, VSSC, SAC, and SHAR, insisted to initiate the 'ISRO Libraries Consortia'. Then a separate request letter was sent to other ISRO libraries to ensure the benefits of this Consortium and/or combined subscription prices. Data processing result depicted that four

major centre libraries put together but independently spend about Rs. 482 lakhs on acquisition of their library materials; over a total budget of 650 lakhs for all ISRO libraries.

Finally it was decided to have a meeting of four major centre librarians to decide on elimination of duplication and to share costly resources wherever possible, exchange of benefits of complementary access to e-journals to save on print subscriptions, opt for combined subscription on consortia price, and to explore other ways of sharing costly resources. So, the ISRO Libraries were felt to gear up more creative resource sharing among the centres as well as to other libraries in order to effectively face the budget crunch and increased prices of information resources. They found a practical and useful solution through cooperative acquisition and/or consortia approach. The Consortia initiative by ISRO libraries expected to result in savings almost worth Rs. 41 lakhs per year. They have expected that once e-journals will be accepted to the users they will lead to huge savings through consortia. ISRO Consortia initiative seem to have CD-ROM Databases - Aerospace Database, Ei-Compendex Database, INSPEC on Disc, Ulrich+, Books in Print on Disc, NTIS (Silver-Platter & Dialog), AIAA on CD, etc., e-Journals -IEL (IEEE's Electronic Library), and Online full-text access to other few costly journals.

11.5.10. HELINET Consortium

Health Sciences Library & Information Network (HELINET) was initiated by the Rajiv Gandhi University of Health Sciences (RGUHS), Bangalore, Karnataka. It is the first medical library consortium in the country, launched on March 15th 2003. It was set up with an objective of networking the college-libraries affiliated to the RGUHS, to promote resource sharing, especially with reference to international medical journals and databases. In view of a survey, conducted in early 2002, the colleges of RGUHS were

spending enormous amount of money to get only about 150 journals each, and even in those 150, many were duplicates. This spurred the need for reducing the cost while making the core medical journals more affordable and easily accessible. Thus HELINET was born with twin objectives - Networking the Libraries in the colleges affiliated to the university to promote resource sharing, and to move these libraries gradually to digital main-stream. HELINET's mission is to network all the libraries under RGUHS for minimizing the cost of acquisition and maintenance of learning resources and maximizing their utilization, among the faculty, students and researchers the colleges and institutions affiliated to the University.

Under the HELINET scheme, the member colleges can get access to around 700 scholarly, international biomedical journals, from 24 leading publishers, at about one-third the price of their print subscription. It also provides the useful links to e-books and other reference sources in Biomedicine. Moreover, the member colleges can get all time access to the current journals as well as archives, i.e., the back-volumes of journals for a period of 7-10 years. The University has already spent Rs. 2 crores for establishing the consortium on a cooperative e-access model and has set up digital library infrastructure for managing and providing access to e-content.

For the purpose, HELINET Consortium sources e-journals from multiple aggregators. For full-text it is subscribing the Elsevier's Science-Direct, OVID Biomedical Collection, Annual Review - Biomedical Suite, etc., and for bibliographic sources it hosts the J-Gate, and J-Gate Custom Content for Consortia (JCCC) from Informatics India Ltd.

JCCC is J-Gate Custom Content for a group of homogeneous consortia members. JCCC-HELINET is an extension of JCCC, which is a customized e-journals access gateway and database solution for the HELINET Consortium,

Bangalore. It provides a common gateway for one-point access, to e-journals subscribed by the consortium and facilitates the common search interface for all the participating members of the 'Consortium'. JCCC@HELINET acts a comprehensive database of journal articles published in the journals subscribed by all medical colleges of RGUHS and available online. The service offers the various facilities and benefits to users, i.e, Common access to Table of Content (TOC), abstracts, and full-text articles. Contents are mirrors in the server of each participating consortia member. Automated e-mail request for photocopies can be sent from one consortia member to another. Users can create their own alert profiles for latest issues using e-mail, denoted as 'MyTOC.

Currently 25 member participants are enjoying the sharing benefits in terms of lower subscription rates and better terms of agreement with the publishers. Moreover, the consortium would also provide technical help and arrange for in-house training for optimal usage of resources subscribed.

11.5.11. VIC CONSORTIUM (ICICI-KP)

Virtual Information Centre (VIC) is a unique facility offered by ICICI Knowledge Park (IKP) for providing better information services to the Research & Development Sectors. VIC has been supported by funds, commitment and involvement from NISSAT of DSIR, Government of India and completed the two-year project in March 2004. VIC provides wide range of information services with the cooperation of several libraries and information centers that form the IKP's Knowledge Network. VIC was set up with an objective of sharing the e-resources and ideas among the Park talents and member organizations. Objectivity it provides fast and reliable access to national and international science and technology information resources through a common

gateway, and strengthening the resource base available in the country.

VIC acts as an electronic platform for fast and reliable access to information and interaction among industry, academia and public research institutions in Science & Technology. It links to digital resources of member partners and facilitates widespread library and literature search facilities. A web interface for virtual meeting, discussion and sharing of ideas is planned. Thrust areas in initial stage are Biotechnology, Pharmaceuticals, Chemical, New materials, IT/ Telecom, etc. VIC has installed seven databases exclusively for the use of VIC members - viz, Directory of Translators in India, Directory of IPR Agents in India, Email directory of Indian scientists, K-Library (Database of Internet Resources in Biotech, Drugs, IT & Telecom areas), Directory of Venture Capital Firms in India, NAFEN Database, Database of Sophisticated Instruments & Facilities.

VIC offers various range of information services to it's three groups of users - (a) Professionals and Research Scholars of more than 12 resident companies at the Park, (b) Premier Institutions of repute (About 24) who are member-partners of the IKP Knowledge Network, and (c) Registered users by payment of Rs 5000 per year; such as R&D Institutions (Govt & Private), Manufacturing companies, Institutes of higher learning, Small scale industries, Consultants & Individuals. Registered users can avail of a host of services at concessional rates. VIC is the member of various consortia, Library networks and libraries.

JCCC@VIC is a NISSAT-Funded initiative to promote resource sharing. Informatics launched this organized resource-sharing consortium, using JCCC as the basis, on 1st July 2002. It is basically a common platform of journal literatures subscribed by the members of VIC Consortium.

A challenge that confronted ICICI-KP was providing

access to its users in the park for research information in several diverse areas from biotechnology to information technology. It found a solution to this challenge in the concept of JCCC, which was undergoing development during early 2002. Encouraged and funded by NISSAT, VIC at ICICI-KP used the concept of JCCC to promote and translate this concept into a "networked resource sharing consortia for journals". Seven institutions including ICICI-KP that currently participate in this consortium are:

- Virtual Information Center (VIC), ICICI Knowledge Park, Hyderabad - (Consortium Leader)
- University of Hyderabad
- Indian Institute of Chemical Technology, Hyderabad
- Center for Cellular and Molecular Biology, Hyderabad
- National Institute of Nutrition, Hyderabad
- ICRISAT, Hyderabad and
- National Chemical Laboratory, Pune

The consortium selected 500+ journal titles subscribed by one or several of the members. JCCC is a central database and gateway for the bibliographic content of these 500+ journals, which are updated regularly. It is a simple concept with a complex design behind.

JCCC-VIC helps the users in obtaining the full-text articles in the way of showing either 'PDF online button' or 'hardcopy button. Online button indicates that user's library has an online subscription/ access rights. User may click on this button to fetch the article instantly to view on his screen. On the other hand, when the User clicks on hardcopy button, an e-mail request is triggered directly to the library that is designated for document delivery. The member-library in the consortium sends the photocopy of the article to the user from its print collection.

It is necessary to say that the ICICI Knowledge Park is a very sophisticated international research infrastructure promoted jointly by Andhra Pradesh Government, ICICI and the Department of Scientific and Industrial Research (DSIR).

11.5.12. DRDO E-Journals Consortium

Defence Research and Development Organization (DRDO), Ministry of Defence, Government of India, is the largest government-funded research and development organization in India with a chain of over 50 laboratories and establishments spread across the country. It is engaged in carrying out research and development of cutting-edge technologies for protecting the frontiers of the country. The vision of DRDO is to make India prosperous by establishing world class science and technology base and provide our Defence Services decisive edge by equipping them with internationally competitive systems and solutions. DRDO's mission is to design, develop and lead to production state-of-the-art, sensors, weapon systems, platforms and allied equipment for our Defence Services. It endeavours to develop infrastructure, committed quality manpower and a strong technology base in the country for self-reliance in critical defence technologies and systems by indigenisation and innovation while equipping the armed forces with state-of-the-art weapon systems and equipment.

DRDO has about 7000 active R&D scientists, actively supported by technical and supporting staff. Over the years DRDO has developed a number of products, systems and technologies encompassing aeronautics, armaments, combat engineering, electronics, materials, life sciences, naval systems, and so on. Some of these products include missiles like Prithvi, Dhanush, Akash, Nag, Brahmos, and technology demonstrator Agni, main battle tank Arjun, radars, sonars, torpedos, and various other allied systems many of which have spin-off benefits in civilian sector also. DRDO's research

output in terms of publications compares well with the other leading scientific institutions of the country. DRDO's innovations and its core competency in knowledge development are functionally access-dependent to latest developments in science and technology by its R&D scientific community.

Each DRDO laboratory has an independent and well established library and information centre that is also backed up with strategic information support from Defence Scientific Information and Documentation Centre (DESIDOC), a constituent establishment of DRDO. The total expenditure by the DRDO laboratories towards procurement of journals covers around 20 crore per annum. Looking the developments in national and international scenario and the success of INDEST-AICTE and CSIR-DST consortia in meeting the multifarious information requirements of their users, it was felt that a similar effort by DRDO would be beneficial to the R&D community who need latest information on their desktops.

With the objectives of providing DRDO S&T personnel global access to the S&T literature through strengthening the facilities for pooling, sharing and electronically accessing the information resources; for facilitating online access to the full text of the journals on 24X7 basis with up-to-date information; and to cope up with the ever increased users as well as growing users demands, DESIDOC in the second half of 2007 took up the task for establishing a mechanism for providing online access on a consortium mode to e-journals across the organization. An analysis revealed that over 1600 unique titles were being subscribed by the DRDO laboratories from more than 400 publishers. Among these, 964 titles were subscribed by only one laboratory, 238 each by two laboratories and 124 each by three laboratories; about 60 titles were highly popular with 10 to 40 laboratories subscribing to these. From these, S&T journals of 25 publishers were short listed based on the

number of titles subscribed across DRDO labs. A proposal was submitted in 2008 for subscription of about 770 unique titles covering 18 publishers. A committee constituted for reviewing the proposal recommended 13 publishers. Request for proposals were invited from all the 13 publishers, but some publishers responded late. Negotiations were held with suppliers of 10 publishers.

The DRDO e-Journal Service came into being with effect from 01 January 2009 covering 448 titles from 7 publishers, namely ACM Digital Library (47 journals, magazines, transactions, etc), ACS (36), AIAA (7), Elsevier Science Direct (195 titles), IEE+IEEE (157 titles plus conferences, standards), Jane's (5), and Science (1). However, due to the limitation of sites available for accessing titles of ACM (5), AIAA (10), Jane's (30), Science (13), and Elsevier Science Direct (access to 195 titles, 8 sites and access to their own subscribed titles in 34 other labs), a content browsing service was felt necessary. J-Gate Custom Content for Consortium (JCCC) Service was added to facilitate access to contents of all the journal titles subscribed by 20 major DRDO labs. JCCC service helps in obtaining a legal copy, by post, of an article required by a user in a laboratory not subscribing the title but is available in another laboratory.

The consortium operates through DESIDOC under a Monitoring Committee comprising members from DRDO head quarter and laboratories. A Review Committee, under the chairmanship of Chief Controller (R&D) with an overall responsibility for making policies, negotiates with publishers for promoting the consortium. DESIDOC manages the subscription of all electronic resources for all participating laboratories. A gateway (website) has been developed for different publishers and will be hosted on the DRDO website. The end user will access the e-resources through the gateway instead of browsing different publishers' websites. The

gateway will contain the information on authorized publishers-wise list of journals an alphabetical list of all the titles with a search facility.

Its Terms and Conditions are based on those of CSIR Consortium. Salient features of the DRDO E-journal Service (DRDO Consortium) as provided by the Licensors are as follows:

- Various options in the Consortium include all the journals to all the laboratories (for example, ACS, IEL), all the journals to selected laboratories (ACM, AIAA), selected journals to all the laboratories (Elsevier), and selected journals to selected laboratories (Jane's, Science).
- Internet Protocol (IP)-enabled access in the labs; where such facility does not exist, the access through login and password.
- Facilities to search, browse, view, and download with an option to download in soft copy or print is allowed.
- In case of any discontinuation or gap the publisher shall inform the reason and the origin of discontinuation and gap.
- The designated users of each DRDO laboratory as well as DESIDOC shall be given access to the publisher's server/database where user statistics is logged into. Licensor shall allow access to download the statistics to two designated staff of each user lab. This access to the designated users of DRDO shall be password regulated. Designated users will have the privilege to download statistics with respect to their labs. In the case of DESIDOC, Licensor will ensure the complete access to usage statistics in respect of all user labs.
- Licensor shall provide usage statistics on monthly basis to DESIDOC of all laboratories data; and also to the

respective laboratories – the lab's statistics only. Data shall be provided for each journal-wise, if required.

- All the DRDO employees will be bonafide users and shall be allowed unlimited access, view, search, browse, download, and print required for their use.
- DESIDOC is the Implementing Agency of the consortium.
- Access to the back volumes with a minimum five years base (calendar year) of full text of all the titles shall be provided. In case of non-availability, these should be provided for the available period.
- In the case of termination or on the expiry of the Agreement, the Licensor shall provide the Implementing Agency (DESIDOC), the full text of the e-journals for the period of agreement on the prevalent formats on CD-ROM, DVD, etc., with the retrieval software for network access. The Implementing Agency shall have the right to duplicate and distribute these among various user institutes of DRDO.
- In case of change in archival technology, the state-of-art archival technology shall be made available by the Licensor at no extra cost for archival of full-text data of e-journals to higher version of technology as and when it arrives.
- The Licensor will conduct training sessions for at least twice in a year in the five zones, namely, New Delhi, Pune, Dehradun, Hyderabad, and Bengaluru at no extra charges.

DRDO Consortium has been established based on a necessity felt by the Heads of Libraries/Technical Information Centres and discussed in the Meeting held on 12 December 2006. As a new programme, it has already made a positive impact on the minds of the R&D community of DRDO. Many

laboratories now are requesting enhancing the coverage of journals by adding publishers like ASME, Emerald, Professional Engineering, Royal Society of Chemistry, Sage, Springer, Taylor-Francis, Wiley, World scientific, etc. On the economics side, DRDO laboratories could save nearly Rs 3 crore by availing of deep discounts offered for print copies and by not subscribing to print copies. There is also a request to include a couple of databases in aeronautics and materials as well as popular standards. Unlike academic consortia where the institutions are all have a common focus, in DRDO each laboratory has a different mandate and focus thus requires a different set of journals. Already DRDO laboratories are having greater resource sharing amongst them and providing increased access to latest R&D developments on 24×7 basis to the S&T community on their desktops with an improved, qualitative and effective article delivery service.

11.5.13. Consortium for E-Resources in Agriculture

National Agriculture Research System (NARS) is comprises of 41 State Agricultural Universities, one Central University, and Indian Council of Agricultural Research (ICAR), which again comprises of 49 ICAR's Central Research Institutes including ICAR headquarter, five Deemed Universities, five National Bureaus, 12 Project Directorates, 30 National Research Centres, 77 All India Coordinated Research Projects and Networks, eight Trainers Training Centres, and 562 Krishi Vigyan Kendras (KVKs).

Indian Council of Agricultural Research is a major agricultural scientific autonomous organization in the country and unique in having concurrent responsibility for research, education, and extension. Formerly known as Imperial Council of Agricultural Research, it was established on 16 July 1929 as a registered society under the Societies Registration Act 1860 in pursuance of the Report of the Royal Commission on Agriculture. The ICAR has its headquarters at Krishi

Bhavan, New Delhi and is an apex body for coordinating, guiding, and managing research and education in agriculture including horticulture, fisheries, dairy, and animal sciences in the entire country. ICAR has played a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India through its research and technology development that has enabled the country to increase the production of food grains by four times, horticultural crops by 6 times, fisheries by 9 times (marine 5 times and inland 17 times), milk 6 times, and eggs 27 times since 1950-51, thus making a visible impact on the national food and nutritional security. It has played a major role in promoting excellence in higher education in agriculture.

Every agricultural institute and university has got its own independent library with self-contained budget and resources to serve their users. Nowadays information explosion, diversity of user needs, multi-disciplinary research, duplicity of resources, escalation in cost of foreign journals, and financial crunch have made self-sufficiency which lead libraries to opt for resource sharing. But advent of Internet, advancement of ICT facilities, easy and 24x7 accessibility have made the libraries to opt for consortium of e-journals to get maximum coverage of journals to larger number of users with minimum amount of budget. To maximize discipline-wise coverage, relevance of journals to users, number of users relevant to publishers, economics of pricing models given by publishers for using additional advantages like unlimited access, unlimited downloads, easy accessibility, any where at any time accessbility, full-text downloads, etc., made the authorities of ICAR to think about formation of e-Consortium under the Project of NAIP Component I: ICAR as the Catalysing Agent for Management of Change in the Indian NARS, Sub-component I: Information, Communication and Dissemination System (ICDS), Module I: Information and Communication Technology (ICT) in the name of CeRA

(Consortium for e-Resources in Agriculture).

Sufficient infrastructure like hardware, software, networking, bandwidth to download full-text of article with images etc., are prerequisite of any e-Consortium. Since these facilities are already provided by ICAR to all its Institutes, Deemed Universities, State Agricultural Universities and Central University in the first phase of World Bank project National Agricultural Technological Project (NATP 1998-2005) the ICAR straight away considered to form e-Consortium under next phase of World Bank project National Agricultural Innovation Programme (NAIP 2006-2012). NAIP is the World Bank assisted agriculture project being executed by National Agricultural Research System (NARS) with lifespan of six years, starting from 24 July 2006 to 2012.

CeRA was launched successfully on 30 April 2008 at its headquarters at IARI with the following objectives :

- To develop the existing R & D information resource base of ICAR institutes/agricultural universities, etc., comparable to that existing in world leading institutions/organizations.
- To create an e-access culture among scientists/teachers in ICAR institutes/SAU.
- To develop a *Science Citation Index (SCI)* facility at IARI for evaluation of scientific publications.
- To assess the impact of CeRA on the level of research publications measured through *SCI*.

CeRA is being hosted at Unit of Simulation and Informatics, A-0 Block, Lal Bahdur Shastri Building, IARI, New Delhi-110 012. Its functioning is being monitored by the following Committees:

Steering Committee : It is advisory in nature and works on policy issues.

Negotiation and Monitoring Committee : It negotiates with publishers, and monitor progress of activities.

Working Committee : This committee discusses current activities.

Access to CeRA was initially given to the following 124 institutes through IP addresses:

(i) Deemed Universities of ICAR: 05.

(ii) ICAR HQ (Krishi Bhavan, Krishi Bhavan I, Krishi Bhavan II): 03.

(iii) ICAR Institutes: 42.

(iv) National Bureaus: 05.

(v) National Research Centres: 21.

(vi) Project Directorates: 09.

(vii) State Agricultural Universities: 38.

Out of 124 institutes, 114 institutes successfully received access through IP address, but institutes/SAU located in remote and north-eastern areas got access through user name and password. Consortium initially entered into agreement for three years under centralized funding and subscription of NAIP by maintaining print subscription of individual libraries who are members of the consortium for the journals on Agriculture, Veterinary Science, Fisheries, Crop Science, Computer Science, Soil Science, Animal Science, etc.

The main features and facilities of consortium are as under:

Springer Link : It is a platform of Springer and bouquet of e-journals on different subjects like Biomedical Sciences, Life Sciences, Agriculture, behavioral Sciences, Economics, Chemistry, Material Sciences, Engineering, Humanities, Social Sciences, Mathematics, Statistics, Veterinary

Medicine, Physics, and Professional and Applied Computers published by Springer. Through this user can access the full text of around 1300+ journals since 1996.

Annual Reviews : Annual Reviews are authoritative, analytic reviews in 33 focused disciplines within the Biomedical, Life, Physical, and Social Sciences etc. CeRA is subscribing 33 Reviews in agriculture including Biochemistry, Biomedical Engineering, Biophysics, Cell and Developmental Biology, Entomology, Genetics, Immunology, Microbiology, Nutrition, Pathology, Pharmacology, Toxicology, Physiology, Phyto pathology, etc., since 1990 onwards.

CSIRO : CSIRO Publishing is an autonomous business unit within Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO). It publishes globally reputed journals on Agriculture, the Plant and Animal sciences, and Environmental Management. CeRA is subscribing 08 journals in Agriculture and Plant Sciences with complete package access.

ScienceDirect : ScienceDirect is the world's leading scientific full text database of Elsevier developed by articles and chapters from more than 2,500 peer reviewed journals and more than 10,000 books. CeRA is subscribing 300+ journals from the field of Agriculture and Biological Sciences.

Apart from having above main feature of CeRA the JCCC Service (Journals Customs Content of Consortium) of Informatics, which covers contents of about 28, 770 journals at present and likely to be increased by approximately 50,000–for all 123 member libraries is also available as an value added service. This service is being covered from Consortia journals, subscribed journals of member libraries, and also open access journals of open j-gate since CeRA was implemented through consultancy of Informatics, Bangaluru. Creation and maintenance of CeRA website, promoting, organizing user awareness programmes, trainings to users and librarians are

also part of its consultancy activities.

When user try to access home page of CeRA, it will be verified with the IP provided by CeRA to Publishers. One official/Librarian has been identified as Administrator from each institute/university and has been assigned User Name, Password to open the admin login. Administrator is also responsible for Document Delivery Service. Members which could not get access through IP address are provided with User Name and Password separately. All functionalities available to Administrator can also be accessed by user except “Admin” functionality.

The Consortia Administrator has the following rights to: Create new members; Edit the contact details, login details and IP details of other members; View region wise consolidated report of Document Delivery Request (DDR); View Statistics of DDRs sent; View statistics of DDRs received; View and fulfill the DDRs received; View the status of DDRs sent; View Journals subscribed by consortia or his own library subscription on click of “Journal Configuration” button; and Get the usage statistics on click of “Usage Statistics button”.

The Institute Administrator can have all the facilities except to edit contact details, login details, viewing regionwise details and view statisties of DDR sent. Apart from the above privileges, institute Administrator can also see the following functionalities when login to “admin” functionality where facility is not accessible to User.

User : Organization-wise and state-wise institute’s details can be seen.

Usage Statistics : Service-, Journal-, Publishers-, and User-wise usage statistics can also be seen from this feature.

Journal’s Configuration : Through this service Administrator can see the list of journals under open access,

Consortium subscribed journals and individual library subscribed journals covered under JCCC.

Inter-Library Loan : Through this feature Administrator can have the following facilities:

(i) Request received from users for document delivery between any particular date with details such as bibliographical details of article, requested by which institute/university, request date, its status like whether it is available in library or not available, if its is available whether it is dispatched or it is pending.

(ii) Request sent by user from his own institute for document delivery between any particular date or range of dates with details such as bibliographical details of article, requested to which institute/ university, request date, its status like received communication from other library, whether it is available in their library or not available, and if its is available whether it is dispatched or it is pending.

(iii) Request received by his library from users of different/ individual institute for document delivery in report form with details like institute's name, number of requests received, document delivery fulfilled or pending or unfulfilled.

(iv) Requests sent by user of his own institute to different/ individual institute for document delivery in report form with details like institute's name, number of request sent, document delivery fulfilled or pending or unfulfilled.

(v) Consolidated report of both requests made and received by own institute and their status in period of different dates.

(vi) Consortium Administrator can see status of document delivery of any library.

Besides, the administrator and users have following facilities under JCCC:

Quick Search : User's query like author, keyword, title can be searched in all peer reviewed journals and/or professional and industry journals. User can simplify his search by selecting subject either by agricultural and biological sciences, arts and humanities, basic sciences, biomedical sciences, engineering and technology, and social and management science or all subjects.

Advanced Search : It will search in all peer reviewed journals and/or professional and trade journals in advanced features by using booleans operators as well as title, keyword, abstract, author, institute/address and selecting subjects on agriculture, biological sciences, arts and humanities, basic sciences, biomedical sciences, engineering and technology, social and environmental sciences, etc., and also by selecting publication year range or latest updated like last one week or last one month.

Browse Journals : User can browse the journals by subject, title or publisher in alphabetical order hyperlink.

My Journals : User will get the alerts of his interest after registering his name by creating his profile with mandatory details.

Experiencing Problem : User can interact with Consortium administrator through online chat about problem facing. When user made query and retrieve search results each article/ journal will be indicated whether it is a Consortium Subscribed Journal (CSJ), Library Subscribed Journal of CeRA members (LSJ) or Open Access Journal (OAJ). If it is CSJ and OAJ, then user will have full text facility, if it is LSJ then Request for Article feature will be displayed with Name of the Institute where that particular journal is available so that user can simply click on it for requesting copy of an article

so that request will go to particular library's admin account where this journals is available. When Institute Administrator login into "admin" module, the details of articles requested by user to his Institute/ University and requests send by his Institute to other Institute / University and its status can be seen online to enable him take necessary action accordingly. Above all Consortium administrator has the right to see any Institute Administrator module.

Institute members under this consortium are listed alphabetically. By clicking on Institute the user can see the details of administrator/librarian/contact person like Department, Address, Phone/Mobile/Fax, E-mail, Institutes Website, etc., for requesting for article or document delivery.

Thus, CeRA has helped in developing the world class R&D information base of ICAR Institutes/agricultural university, and an e-access culture among scientists/ teachers. Efforts are being made to bring journals of John Wiley and Taylor and Francis's, and two journals of Nature. ICAR may also subscribe Web of Science and Indianjournals.com to further increase the scope of information retrieval.

11.5.18. Consortia for Medical Information

Indian Council of Medical Research, the apex body in India for the formulation of biomedcal research, which was founded in 1911, is one of the oldest medical research bodies in the world. As early as in 1911, the Government of India set up the Indian Research Fund Association (IRFA) with the objectives of supporting and coordinating the various medical researches in India. It was renamed as Indian Council of Medical Research in 1949. The Council's research priorities coincide with the national health priorities such as control and management of communicable diseases; fertility control, maternal and child health; control of nutritional disorders;

developing alternative strategies for health care delivery, containment within safety limits of environmental and occupational health problems; research on major non-communicable diseases like cancer, cardiovascular diseases, blindness, diabetes and other metabolic and hematological disorders; and mental health research and drug research. All these efforts are undertaken with a view to reduce the total burden of disease and to promote health and well being of the population. The Council promotes biomedical research in the country through intramural as well as extramural research.

In this digitally-enabled world, the convergence of information and communication technologies (ICTs), the web, and the Internet are the most striking developments. The whole world is converting into a Global Electronic Village as the traditional constraints of time and space are disappearing. The globalization of information is taking place and territorial boundaries are becoming meaningless due to developments in ICTs. In present scenario, there are many ways available for accessing and dissemination of information to the users. A consortium is the best way to fulfill all the requirement of the users. ICMR has undertaken various activities to help address the challenges of digital technology to research scholars/scientists. ICMR has initiated two types of consortia: (i) JCCC@ICMR which covers all ICMR subscribed journals and full text of over 200 free journals, and (ii) ICMR e-consortia which provides full text of subscribed e-journals only.

J-Gate Custom Content (JCC) acts as a bibliographic database and provides single access point for searching the locally subscribed journals, both print and electronic. The major advantage of JCC is its ability to maximize the usage of the journals subscribed by the library. It provides access to all the print and electronic journals to the users under a single platform. J-Gate Custom Content for Consortia (JCCC) is an extension for library consortia. It is a shareable

bibliographic database between the member institutes which allows the members of the consortia to access the full text and the incorporated union catalogue of the journals managed by the Informatics India Ltd.

JCCC@ICMR (http://www.jcccicmr@informindia.co.in) is an extension of JCC for a group of homogenous consortia members of the ICMR. It was started in 2004 and covers 1047 journals received collectively at 25 institutes/centres of the ICMR. In addition, around 189 open access journals are also covered. In all, journals from 448 publishers are covered on a single platform. As it is always a daunting task to locate an article or journal from the collection of more than one library. For the faster retrieval of details regarding a particular journal or the article, it is difficult to rely on manual technique. ICMR with the help of Informatics India took the initiative to provide a common access point to its different libraries and information centres, so that they can know what the other libraries of the Council are subscribing and at the same time also increases the usage of these sources among the Council's libraries. All the 25 ICMR's libraries and information centres are the members of JCCC@ICMR and reaping its benefits. JCCC@ICMR was launched on 27 July 2004. Presently, JCCC@ICMR is providing a single point access which is updated weekly, to around 1047 journals out of which 858 journals are subscribed by 25 ICMR's network of library and information centres and 189 are open access biomedical journals.

Scientists of ICMR can access the full text and the abstracts of all the journals available free on the platform. The scientists can easily locate the journal of their interest from the journals subscribed by the member library and if they find any article then by using the same platform they can send an e-mail request to that particular library of the consortia. JCCC@ICMR is a bibliographic database of print and electronic journals that the member libraries are

subscribing. It provides a common platform for all the members to have an access of detail regarding the availability of journals. After locating the article, request can be made by clicking the "hard copy" button.

Its important missions are:

- To provide a common gateway to e-journals for the participating members of the consortium.
- To provide a common access and search interface for all journals subscribed by the consortium members.
- To provide an insured and dependable journal archive source for the consortium members.

Significance of JCCC-ICMR can be pointed out as under:

- It is a common access to table of content (TOC) and full text articles for 1047 journals.
- It has common TOC and Database search facility for print and online journals, which have scholarly content and are subscribed by the consortium members.
- It links to abstracts of articles.
- It links to full-text articles from JCCC interface.
- It has facility to search bibliographic database of articles.
- Its content is mirrored in the server of each participating consortia member.
- It links to the journals subscribed by each participating consortia member.
- E-mail request for photocopies can be sent from one consortia member to the other.

ICMR e-consortia was started in 2007. ICMR initially subscribed few e-joumals in a consortia mode for all ICMR Institutes. All the scientists of ICMR and its institutes can

access these journals from their desktop.

The salient features of ICMR E-Consortia can be listed as under.

- Journals can be accessed through IP addresses of the various institutes' libraries including head quarter.
- Back volumes of *Lancet* (1996), *BMJ* (1994), *NEJM* (1993), *Nature* (1997), and *Science* (1997) are also available online.
- Besides, it has organized several user awareness meetings to promote the use of these journals.

Thus, the availability of the e-consortia among ICMR network of libraries has enabled scientists to access the journals from their desktop. As per the latest usage statistics, usage of journal literature has been increasing every year. The interaction among ICMR librarians has increased a lot and dissemination of information in a more organised and efficient manner.

Now, some discussion on two big consortia initatives in India-INDEST-AICTE Consortium for Science and Technology and UGC-INFONET Digital Library Consortium for University Libraries in India. The details of INDEST and UGC-INFONET library consortia are based on Arora and Trivedi articles published in *DESIDOC Bulletin of Library and Information Technology* during 2010.

11.5.19. INDEST-AICTE Consortium

The proposal for consortia-based subscription to electronic resources was first discussed at length at the National Seminar on Knowledge Networking in Engineering and Technology Education and Research held at IIT Delhi during 1-2 December 2000. On the recommendations of one of the work groups of this Seminar, a preliminary proposal on consortia-based subscription to electronic resources was

prepared and circulated to all IITs, IISc, and RECs (now NITs). On the basis of feedback obtained from these institutions, a revised draft proposal was prepared which encompassed other engineering colleges and institutions also as beneficiary of this initiative. The Ministry of Human Resource Development (MHRD), based on the last draft proposal, appointed an expert group in April 2002 for Consortia-based Subscription to Electronic Resources for Technical Education System in India under the chairmanship of Prof. N. Balakrishnan from IISc, to discuss elaborately on the e-resources with the publishers and aggregators and evolve a working model for execution of the Consortium.

The expert group submitted its report in September 2002 and consequently INDEST Consortium was set-up in 2003 by the MHRD. Thirty-eight centrally-funded government institutions including IITs, IISc, NITs, IIMs, IIITs, and few other institutions are core members of the Consortium. The Ministry provides funds required for accessing e-resources to the core members through the Consortium Headquarters (HQ) situated at NT Delhi. All new IITs, IISERs, IIMs, and IIITs (centrally-funded) qualify for inclusion as core members of the Consortium.

The INDEST Consortium was re-named as INDEST-AICTE Consortium in December 2005 as AICTE took the lead to spread the access to e-resources to all its affiliated institutions. The INDEST-AICTE Consortium is the most ambitious initiative taken so far in the country. The benefits of consortia-based subscription to electronic resources are not confined to centrally-funded technological institutions in the country only but are also extended to all educational institutions under its open-ended proposition. Sixty government/government-aided engineering colleges are being provided access to selected electronic resources with financial support from the AICTE. More than 820 engineering colleges and institutions have already joined the Consortium

under its Self-Supported category. The Consortium is also a member of International Coalition of Library Consortia (ICOLC).

The total number of members in the Consortium has grown to 928. The Consortium, on the basis of sheer strength of number of institutions, has attracted the best possible prices and terms of agreement from the publishers, and currently facilitates access to e-resources to more than a million students. It subscribes to over 12,000 e-journals and six bibliographic databases from a number of publishers and aggregators. The INDEST website hosts a search and browse interface to locate these journals and their URLs.

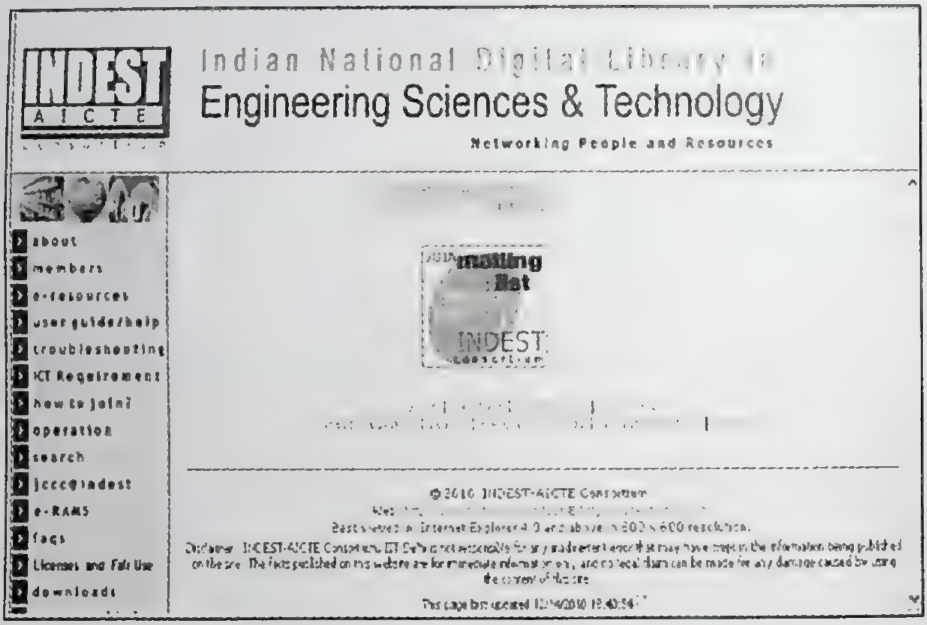


Fig. 11.3. Home Page of INDEST

The Consortium operates through its HQ under the National Steering Committee consisting of Director, IIT Delhi as its ex-officio Chairman and Chairman, AICTE as its Co-chairman, Members from amongst the beneficiary institutions include two representatives each from IITs and NITs; one representative each from IISc, IIITs and IIM; representatives from self-supported institutions; Director (Technical

Education), MHRD; and Adviser (PC), AICTE. The Committee is responsible for taking major policy decisions as well as their execution. In addition, a National Review Committee, under the Chairmanship of Joint/Additional Secretary (Technical Education), meets annually with an overall responsibility for making policies, monitoring the progress, and coordinating with UGC and AICTE for promoting the activities of the Consortium. Further, a National Advisory Committee, constituted by the Joint Secretary (Technical Education), comprises of representatives from amongst member institutions, Financial Adviser, MHRD; National Coordinator, INDEST-AICTE Consortium; and representatives from the AICTE and UGC. The National Coordinator for the Consortium is appointed by the Technical Bureau of MHRD and is responsible for all the operations of the Consortium. The National Coordinator is also the Member Secretary of the National Steering Committee.

INDEST-AICTE Consortium has three categories of members, namely, core members, AICTE-supported institutions, and self-supported institutions. Number of members in the Consortium has increased from 115 in 2003 to 928 in 2009. The INDEST consortium members includes the following:

MHRD funded 38 Core Group of Member Institutions: IITs and IISc (eight institutions), NITs, ISM, SLIET and NERIST (twenty institutions); IIITs and PEC Chandigarh (three institutions); IIMs, NITIE and IIITM (eight institutions)

Members with Financial Support from the AICTE: The AICTE has identified 60 Government Engineering colleges or technical institutions that offer programmes at postgraduate level. These institutions are being given access to a number of electronic resources including IEL Online Library, ASCE Journals, ASME Journals, Applied Science and Technology Plus (ASTP) and J-GATE for Engineering and Technology (JET).

Other Engineering Colleges and Institutions: The consortium, invites AICTE-accredited and UGC- affiliated institutions to join hands with the leading Engineering and Technological Institutions in India. 15 other engineering colleges and institutions have already joined the consortium on their own.

The goth n membership in different categories is shown in below given Table. 11.3.

Table 11.3. Growth in Number of Membership in Different Categories

Category of Members	2003	2004	2005	2006	2007	2008	2009
Core members	38	38	38	38	38	42	48
AICTE'Supported members	60	64	63	60	60	60	60
Self-supported members	17	50	75	493	530	690	820
Total	115	152	176	590	628	792	928

Resource Sharing

The Consortium subscribes to 14 full-text e-resources, five factual/statistical databases, and 6 bibliographic databases from 24 publishers including scholarly societies, commercial publishers, and aggregators. While full-text resources subscribed by the Consortium contain full-text of electronic journals, conference proceedings, standards and protocols, chapters of books, etc., the bibliographic databases contain abstract of articles published in journals, conference proceedings or chapters in books along with links to the full-text e-resources The few factual/ statistical databases, subscribed for business and management schools, contain factual/statistical data including analytical and financial reports

on industries and companies.The details of resources subscribed and accessible to the core members of the Consortium are given in Table 11.4.

Access to electronic resources is IP-enabled for all the members except for institutions that do not have static IP addresses.

License Agreement and Fair Use

Copyright is manifested in terms of licenses in digital environment. The Consortium is required to sign license agreement with the publisher on behalf of its member institutions. The terms of licenses for digital collection vary in terms of conditions, variety of pricing models and access limitations. While the Consortium signs the license agreement prepared by the publisher, care is taken to incorporate terms and conditions mentioned below for as many publishers as possible.

Simultaneous Users : There is no limit on number of simultaneous users for most of the resources subscribed by the Consortium, except for IEL Online, Web of Science, and SciFinder Scholar. Any number of users can access e-resources including e-journals and bibliographic databases at any given time except for the three resources mentioned above.

Walk-in Users : Walk-in users who are physically present at the subscribing institutions are allowed to use the resources.

Print-independent Subscription : Subscription to e-resources is print-independent in most of the cases except Elsevier's ScienceDirect, Springer and Emerald Xtra. As such, beneficiary institutions are free to drop subscription to print copy of journals accessible to them through the Consortium.

Inter-library Loan (ILL) : Licensee is allowed to fulfill

Table 11.4 : Electronic resources subscribed and accessible to the core members

S. No.	Electronic resources	URL	No. of Jls.	Core members Categories	No.
		Full-text Resources			
1.	ABI /INFORM Complete	http://www.il.ProQuest.com	4,374	I&IVA	15
2.	ACM Digital Library	http://portal.acm.org/portal.cfm	44	I-IV	38
3.	ASCE Journals	http:// www.scitation.org/	30	I&III	28
4.	ASME Journals	http:// www.scitation.org/	22	I, II & V	28
5.	ASTM Digital Library	http://enterprise.astm .org	5	I, II& V	28
6.	EBSCO's Business Source Premier	http://search.epnet.com/	10,532	I & IVA	13
7.	Emerald Management Extra	http://iris.emeraldinsight.com/	125	I & IVA	13
8.	IEL Online	http://ieeexplore.ieee.org/	241	All*	38
9.	Indian Standards		217	I & II	28
10.	Nature	http://www.nature.com/	1	I, II & III	28
11.	ProQuest Science	http://www.il.ProQuest.com/	622	II & IVB	22
12.	ScienceDirect	http://www.sciencedirect.com/	2,149	I, II & IVA	34
13.	Springer	http://www.springerlink.com/	1,059	I, II, IVB & V	30
		Factual/Statistical Databases			
14.	Capitaline	http://www.capitaline.com/		I & IVA	13

15.	CRIS INFAC Ind. Info.	http://www.crisil.com/		I & VA	6
16.	Euromonitor (GMID)	http://www.portal.euromonitor.com	29	I & IVA	13
17.	INSIGHT	http://www.insight.asiancerc.com/		I & VA	6
		Bibliographic Databases			
18.	Compendex Plus	http://www.engineeringvillage2.org		I	8
19.	INSPEC	http://www.engineeringvillage2.org		I	8
20.	JCCC	http://jccc-indest.informindia.co.in/		All	38
21.	MathSciNet	http://www.ams.org/mathscinet		I & III	8
22.	SciFinder Scholar	http://www.cas.org/SCIFINDEFR/SCHOLAR		I	8
23.	Web of Science	http://isiknowledge.com		I	8

* *Except G-III; Categories: I: IITs and IISc; II: NITs, SLIET, ISM and NERIST; III: IISER; IV: IIMs, IIITMs & NITIE; IVA: IIMs; IVB: IIITMs & NITIE and V: NIFFT and NITTTRs*

ILL requests from non-authorized users using printed copy of article downloaded from the licensor's website.

Usage Statistics : Publisher is required to submit COUNTER compliant usage/statistics on number of downloads –both full text and abstracts, in a given month, previous month, and cumulative for one year.

Inclusion of Additional Titles : The publisher is required to provide access to new journal titles that are added during the contract period at no additional cost.

Electronic Link : The licensee may provide electronic links to the licensed materials from licensee's web page, either at journal-level or at article-level and publisher would provide help in doing so,

Protection on Increase of Price : Publisher would provide protection on increase in price of subscribed resources. The increase should not be more than 5 percent.

Perpetual Access and Archival Rights : In case of termination of the agreement or on the expiry of the agreement, publisher would extend perpetual access to e-resources for the paid period of subscription along with their back files offered during the subscription period. Alternatively, the publisher would provide full text of e-resources with back volumes for each year on prevalent formats, i.e., CD-ROM/ DVD-ROM with the retrieval software for access on the network. In case of change in archival technology, the state-of-art archival technology shall be made available by the licensor to subscribers at no extra cost for archival of full-text data of e-journals to higher version of technology.

Awareness and Training : The publisher or its representative would conduct Users Awareness Programme on campuses of member universities at no charge to the universities. The publisher would provide publicity material, brochures, posters and user-support material in both prints

as well as in CD form.

E-print Archive : Member institutions would be allowed to download bibliographic records, abstracts and full-text articles published by their faculty, researchers, students, and staff from publisher's site and import them in their local database and Institution Repositories.

All disputes arising under the agreement shall be settled under the rules of the international arbitration court by one or more arbitrators in accordance with the said rules. The place of the arbitration shall be in India and carried out in the English language.

Usage Analysis

Most publishers maintain detailed usage statistics compliant to an international standard called COUNTER for resources offered by them to the Consortium. Comparative usage statistics for member institutions is obtained from the publishers and is made accessible to the member institutions through the INDEST website. Institutions with low usage are requested to optimize their usage. A custom-made web interface called e-RAMS (Electronic Resource Access Management System) has especially been designed to provide and deliver statistics of usage to member institutions. Besides, publishers also provide User ID and Password to the member institutions for accessing usage statistics of their resources directly from publisher's website. The analysis of usage statistics of e-resources by member institutions reveals that there is a consistent increase in usage for all e-resources from 2003 to 2008.

Table 11.5 depicts increase in usage of various resources by different categories of core institutions from 2003 to 2008. The data reflects consistent increase in usage from 2003 to 2008 for all resources by all categories of institutions amongst the core members. The increase in usage for IIMs

was calculated from 2004 to 2008 since most of the management resources were added in 2004.

Tables 11.5-11.9 depict that while there is an appreciable increase in usage of all full-text e-resources, the usage of bibliographic databases have decreased substantially with exception to SciFinder Scholar. The decrease in usage of bibliographic databases is global phenomenon. Most of the management resources have registered appreciable increase in usage except in case of ABI Inform where there is a slight decrease in usage for 2008. The most bibliographic databases have registered appreciable increase in usage from 2003 to 2005. After 2006, the usage of bibliographic databases has come down significantly except in case of SciFinder Scholar that has registered significant increase in all the years.

AICTE institutions have also registered a significant increase in usage of e-resources subscribed for them in terms of number of research articles downloaded from 2003 to 2008. The comparative decrease in usage of ASCE and ASME is attributed to the failure of scitation platform, which resulted in missing usage statistics for a number of institutions for certain duration. Table 11.10 depicts increase in usage of e-resources by AICTE-supported institutions. But the increase in number of downloads in case of self-supported institutions has not been analysed because self-supported members had joined the Consortium over the years. However, Table 11.11 provides number of subscribers for each e-resource. It may be noted that IEL Online is the most favourite resource amongst self-supported category of institutions with 428 subscribers followed by ASME Journals with 174, ScienceDirect with 136, and Springer with 97 subscribers in 2009.

Table 11.5. Increase in Number of Downloads from 2003 to 2008

	2003	2004	2005	2006	2007	2008
Group I (IITs/IISc)	43,55,795	89,68,111	1,90,51,318	2,61,44,693	2,42,76,721	2,57,20,819
Group II (NITs)	3,74,288	7,39,157	9,18,399	10,19,887	15,72,582	17,82,431
Group III (IIITs)	12,965	12,765	24,669	29,109	89,405	59,355
Group IV (IIMs)	36,453	49,16,087	2,00,91,489	3,19,25,216	28,57,78,500	2,95,69,533
JCCC	37,930	40,637	55,020	68,928	83,694	60,759
Grand Total	48,17,431	1,46,76,757	4,01,40,895	5,91,87,833	31,18,00,902	5,71,92,897

Table 11.6. Increase in Usage of ASCE, ASME and IEL Online from 2003 to 2008

E-resources	2003	2004	2005	2006	2007	2008
ASCE	25,860	1,90,912	2,19,988	83,707	92,057	2,64,581
ASME*	0	69,236	86,826	1,57,483	2,08,231	1,18,567
IEL Online	11,92,963	11,90,227	14,06,471	15,81,797	17,31,474	18,35,970

* Usage statistics for ASME for the year 2003 is not available

Table 11.7. Increase in Usage of ScienceDirect, ProQuest and Springer from 2003 to 2008

e-resources	2003	2004	2005	2006	2007	2008
ScienceDirect	13,51,471	24,19,210	28,30,345	38,37,519	41,61,187	51,12,723
ProQuest	13,349	21,208	17,627	16,402	18,343	16,486
Springer	38,363	45,411	42,151	86,763	4,09,920	5,17,648

Table 11.8. Increase in usage of ABI Inform Complete, Capitaline, EBSCO's BSP and Emerald from 2004 to 2008

E-resources	2004	2005	2006	2007	2008
ABI Inform Complete	1,07,655	1,35,229	1,23,883	1,27,644	1,09,838
Capitaline	65,50,307	2,89,76,243	4,96,68,725	4,45,29,394	4,57,91,169
EBSCO's BSP	2,15,979	2,08,160	2,14,191	2,36,177	2,36,413
Emerald Insight	33,997	53,566	1,06,409	1,33,723	1,42,018

Table 11.9. Increase in Usage of Bibliographic Databases from 2003 to 2008

E-Resources	2003	2004	2005	2006	2007	2008
Compendex and INSPEC	17,42,141	27,59,606	38,09,090	10,70,697	4,67,324	2,31,158
MathSciNet	1,09,296	1,65,922	1,88,342	2,34,189	4,69,268	2,37,412
SciFinder Scholar	2,36,338	3,74,049	4,82,398	5,23,550	5,54,231	10,38,488
Web of Science	24,314	40,187	5,52,347	6,42,985	4,07,325	11,97,282

Economics of Indest-AICTE Consortium

The factors that determine economic viability and cost-effectiveness of consortia-based subscription are: its membership, intensity of usage, successful migration from print to electronic version.

A consortium is more meaningful and effective if it has larger number of members The collective strength of members of the consortium provides it the power to bargain with the publishers for better rates of subscription and terms of licenses. The cost of subscription to e-resources comes down as more and more institutions join the consortium. The INDEST-AICTE Consortium took the benefit of large number of subscribers for IEL Online, ASCE and ACM Digital Library as mentioned below:

IEL Online (Single User) : The cost of subscription decreased by 12,50 percent in the year 2003, i.e., from US $ 8100 to US $ 7350 when the subscribers to IEL Online (single user) increased from 10 to more than 75.

ASCE Online : The cost of subscription decreased by 8.33 per cent in the year 2003, i.e. from US $ 3600 to US $ 3300 when its subscriber base increased from 28 to more than 36.

Table 11.10. Increase in Usage of e-resources for AICTE-Supported Institutions

e-Resources	2003	2004	2005	2006	2007	2008
ASCE	4,031	23,924	38,946	22,188	74,140	20,816
ASME	2,225	16,230	27,212	22,053	72,154	32,432
IEL Online	1,69,722	3,52,861	5,49,306	8,84,993	8,89,646	7,89,757
ProQuest	415	915	1,568	1,371	1,652	1,679

Table 11.11. Number of Subscribing Each e-resource Self-Supported Institutions for E-Resources

e-Resources	2006	2007	2008	2009
ABI Inform Complete	4	9	9	5
ACM Digital Library	23	33	40	50
ASCE Journals	21	89	87	83
ASME Journals	30	196	195	174
ASTM Digital Library	-	11	3	4
Compendex Plus	3	3	1	2
DEL	-	121	78	53
Emerald Xtra	-	1	15	15
IEL Online (1 User)	86	405	424	428
IEL Online (15 User)	-	-	1	1
IEL Online (5 User)	-	28	23	21
IET Digital Library	-	-	-	6
Indian Standards	3	7	7	9
MathSciNet	6	5	11	13
ProQuest Science	7	9	5	5
ScienceDirect	6	12	99	136
Springer Link	6	105	86	97
	195	1034	1084	1061

Subscription cost for both the above mentioned resources came down drastically in the same year as more number of members joined the Consortium.

ACM Digital Library : The cost of subscription decreased by 3.51 per cent in 2003-2004, i.e. from US $ 4560.25 in 2003 to US $ 4400 in 2004 when its subscriber base increased from 28 to more than 40.

Besides the Consortium, with its collective strength of participating institutions, has attracted highly discounted rates of subscription coupled with most favourable terms of agreement. In effect, the members of the Consortium avoid the cost commitments on the following:

Lower Rates of Subscription : The rates offered to the Consortium are lower by 50 percent to 98 percent depending upon the category of institution. The Consortium was offered lower rates of subscription from the vendors not only because of combined strength of its members but also due to the eagerness of publishers to enter the Indian market. Cost avoidance on account of lower rates of subscription for the members of the Consortium is calculated in terms of difference between cost paid by the Consortium for member institutions for e-resources and cost payable by individual institutions in case the resources were subscribed by them on their own

There is a notional saving of Rs 643 crore considering the fact that the same resources on list price would have cost Rs 692 crore as against Rs 24.42 crore paid by the INDEST-AICTE Consortium for 2009 for its core members.

Annual Increase in Rates of Subscription : Members of the Consortium have the benefit of cap on the annual increase in the rates of subscription. While the usual increase in price of e-resources vary from 10 percent to 15 percent, members of the Consortium enjoy the cap on increase in price ranging from 4.5 percent to 8 percent.

Capital on Annual Increase on Print Subscription : Several publishers also extend the benefit of capital on the annual increase in the rates of subscription of e-resources on print resources. While the usual increase in price of e-resources vary from 10 percent to 15 percent, members of the Consortium enjoy the capital on increase in price ranging from 5 percent to 6 percent.

Lower Rates for Print Subscription : The publishers of e-resources offer lower rates of subscription for print publications to the member of the Consortium in lieu of their subscription to the electronic version. For example, subscriber to IEL Online (5 and 15 simultaneous users), ASCE, and ASME Journals Online, can avail subscription rates for the print version of these resources. The discounted print subscription rates for these resources are given in Table 11.12.

Intensity of Usage: The recovery of cost incurred on e-resources subscribed through the Consortium can be judged in terms of intensity of usage of resources. Most publishers maintain detailed usage statistics for resources offered by them to the consortium. The INDEST-AICTE Consortium obtains comparative usage statistics for member institutions from the publishers and sent to the member institutions regularly with a request to optimise the usage and check misuse, if any.

The cost recovery is calculated on the presumption that if the e-resources were not available through the Consortium, articles downloaded from these resources by the member institutions would have been sourced on ILL/ document delivery at a cost of US $ 15 per article. The cost recovery table is led by Group I institutions (NTs and IISc) with Rs 1697.57 crores as cost of articles downloaded by them as against Rs 27.87 crores spent on subscription to e-resources recording a gain of Rs 1685.85 crores in terms of cost of research articles downloaded in excess. Group II institutions (NITs, SLIET, ISM and NERIST) were second on the cost recovery table with Rs 117.64 crores and Rs 7.83 crores as the cost of articles downloaded and cost of subscription to e-resources, respectively with Rs 109.80 crores for cost of articles downloaded in excess. All categories of institutions recovered the cost incurred for e-resources subscribed for them although the extent of usage varies from one category

to another. The cost recovered in case of AICTE supported institutions is Rs 55.74 crore comparing to Rs 2.67 crore spent by the Consortium, i.e. articles worth Rs 53.06 crore were downloaded in excess.

Table 11.12. Discounted Print Subscription Rates for Resources subscribed by the Consortium

Items	No. of Journals	Regular Subscription Rate	Consortium Subscription Rate	Discount in Percentage
			In Rupees	
IEL-ASPP Package	140	2431880	1185280	51.26
ASCE Journals	31	594790	172800	70.94
ASME Journals	24	435200	174080	60.00

Average Cost of an Article/Record : The average cost of a full-text article or a bibliographic record varies from Rs 0.46 in case of IIMs to Rs 43.94 in case of NITs as depicted in Table 11.13. In case of IITs/IISc, average cost of article is as low as Rs 10.84. The trend clearly shows that bibliographic databases are less cost-effective since full-text databases are preferred over bibliographic databases and are used more extensively in comparison to bibliographic databases.

The INDEST-AICTE Consortium, as a policy, has asked their core member institutions to decrease their print resources gradually. It was, however, observed that several e-resources are linked to their print subscriptions and the core member institutions are not at a liberty to delete their print subscriptions that are linked to electronic access. The member institutions were, however, suggested to cancel their print subscription in preference to electronic accesses, wherever possible. The member institutions of the Consortium have recorded a saving of Rs 16.39 crores on account of deletion of print subscription to resources being subscribed

by the Consortium. This savings assume special significance considering the following facts:

Table 11.13. Average Cost of Articles for Different Categories of Core Members

Category of Institutions	Cost (Rs)
IITs/IISc	10.84
NITs	43.94
IIITs	36.71
IIMs	0.46
AICTE-supported members	31.75
Consortium average	24.74

(i) Total amount spent on subscription to e-resources for these 48 institutions was Rs 31.39 crores during 2008-2009;

(ii) The Consortium subscribes to more than 12,000 e-journals and six bibliographic databases. As such the access to e-resources to all 48 institutions has increased significantly from almost negligible; and

(iii) All the institutions do not get access to all the resources subscribed by the Consortium, however, an interface called JCCC facilitates access to all journals at the content level to all core members of the Consortium. The JCCC offers an environment to a user wherein he/she may request one of the libraries in Consortium for a full-text article which is not accessible at his/her institution.

It may also be noted that access to full-text resources in most of the institutions has been raised from negligible to more than 12,000 journals and six bibliographic databases.

Implementation Strategies

It is inevitable to take steps to ensure utilization of resources in all member institutions considering the fact that funds required for subscription to e-resources for most of the institution are met by the Government. Some of the important steps taken in this direction are as follows:

Promoting Use of Resources : The Consortium needs to take steps to promote usage of subscribed resources amongst the member institutions. It maintains a comprehensive website and a template web page for all member institutions. Besides, training programmes and annual meets, both at institute level and consortium level, posters, brochures and user manuals were prepared and distributed amongst member institutions. Soft copies of these tutorials have also been made available through the INDEST website. The website also provides links to web-based tutorials available for these resources.

Usage Monitoring : Most publishers maintain detailed usage statistics for resources offered by them to the Consortium. Comparative usage statistics for member institutions is obtained from the publishers and sent to the member institutions regularly with a request to optimise the usage and check misuse, if any. A custom-made web interface called e-RAMS (Electronic Resource Access Management System) was especially designed to provide and deliver statistics of usage to member institutions. The usage statistics for several resources are accessible to the institutions through web-based interfaces from the publisher's site.

Users' Group at Each Institution : With an aim to optimize usage of e-resources made available through the Consortium, each member institution is required to constitute an INDEST Consortium Users Group Committee, which may be a Sub-committee of the existing Library Committee. The

INDEST Consortium Users Groups are required to meet once in a month to review the usage and other problems.

Users' Convention at Each Institution : It is obligatory for each institution to organize a User Convention in their respective institutions for e-resources accessible to them through the INDEST Consortium for the benefit of their user community.

Regional Coordinators : The Consortium has provision to appoint regional committees and regional coordinators to promote subscription to e-resources through the INDEST Consortium amongst educational institutions.

Copyright and IPRs Issue : Users as well as librarians are sensitized on issues of licenses and agreements that consortium signs with the publishers. Users are informed about "does" and "don'ts" in electronic environment. While most of the publishers allow ILL, electronic delivery of articles are not allowed. The Consortium website provides detailed information about license agreements signed with the publishers on behalf of member institutions.

Reliability of Connectivity : The availability of adequate Internet connectivity and bandwidth are crucial for optimal use of e-resources. Steps are being taken at the institutional level as well as at the level of Ministry to increase bandwidth and connectivity available to each centrally-funded technical institution.

Benchmarking Outcomes : Providing access to e-resources to the faculty and researchers is not a purpose in itself. It is only a means to trigger a stronger research and academic culture in the institutions recipient of this benefit. *Science Citation Index (SCI)* is considered to be a filtering mechanism that indexes qualitative research output based on citations received by it. The *SCI* can also be searched to find out qualitative productivity on institutions. The source

articles appeared in *SCI* for all INDEST members in 2003 can serve as a yardstick to measure current research output of these institutions. The research output in 2003 can then be compared with their research output in 2009 to measure the impact of e-resources provided through the INDEST-AICTE Consortium on the research productivity of beneficiary institutions over a period of five years.

However, the number of publications in *SCI* cannot be considered as sole criteria for measuring productivity of institutions. Other criteria that may also be considered include: patents, research projects, research reports, honours and awards, etc.

Categorisation of Institutions based on Usage : Member institutions of the INDEST-AICTE Consortium are categorized based on the recommendation made by the Task Force on Human Resource Development in Information Technology. As such, eight institutions (all IITs and IISc) are considered as Category I institutions, NITs (20); ISM, Dhanbad; SLIET; and NERIST fall under Category II institutions; and IIIT (Allahabad), and IIITM (Gwalior) are considered as Category III institutions. IIMs are considered as a category in themselves, and NITIE and IIITM (Gwalior) are also included with IIMs for purpose of providing e-resources to them.

The category of institutions are basically used to denote the level of usage of e-resources, conceived to be highest amongst institutions in Category I, modest in Category II and lowest amongst the Category III. Further, usage of e-resources requires ICT infrastructure. While all Category I institutions have well-developed ICT infrastructure, most Category II and III institutions have at least modest ICT infrastructure. The rates of subscription, number of simultaneous users and number of resources offered to various categories of institutions are worked out based on

their usage/suitability to the respective categories of institutions.

Training of Users : The web-based search and browse interfaces allow a user to conduct his/her own search without the help of an intermediator, i.e., a librarian or an information specialist. However, it is important that users are trained in the art of searching so that they can conduct better search that provide better results and save their time. Training programmes are a crucial requirement that a consortium has to fulfil to facilitate optimum use of subscribed e-resources. Training programmes act as a bridge to facilitate better communication amongst members of Consortium and find answers to common problems. Such programmes make users competent to conduct their own searches more effectively. Proper training would make library staff more competent enabling them to provide qualitative services. "On the job" training programmes are preferable not only because they benefit large number of users but also solve localized technological problems that can be solved by the experts available at the time of imparting training.

Imparting training to members of the INDEST-AICTE Consortium is a decentralised activity. All IITs, NITs and IIMs may conduct training programmes in their respective regions with financial support from the Consortium. Moreover all member institutions of Consortium are also required to conduct training programmes in their respective institutions for the benefit of their users. The Consortium has signed a tripartite agreement with the publishers of e-resources with a local vendor as third party responsible for providing training on resources at campuses of various member institutions. All institutions have been requested to take benefit of this arrangement and organise training programmes on various resources within their institutions.

Archival Access/Back-up : Unlike in print media, the

electronic access is made available for the period of subscription. The electronic access gets terminated as soon as the subscription period is over even for the period for which subscription was paid. Most publishers have made offers for archival back-up or access to e-resources if Consortium decides to discontinue subscription to their resources. The offers made by the publishers fall under the following categories:

(i) Perpetual Access to Resources for Subscribed Period: Publishers like Elsevier Science and Springer have a policy to provide perpetual access to their subscribed resources for the period of subscription.

(ii) Back-up on CD-ROM made available during Subscription Period: Backup on CD-ROM is being supplied along with its web-based access for resources like ABI/Inform Complete, ProQuest's Science and EBSCO Business Premier.

(iii) Back-up of Data to be Supplied on CD-ROM on Termination of Subscription: Several publishers, like EI Village and Springer Verlag, have agreed to provide their data on CD-ROM on discontinuation of service.

(iv) Local Hosting of Electronic Resources: ACM Digital Library has set up a local server that would host entire contents of ACM Digital Library using search and browse platform used by Group I.

More recently, all publishers have been requested to provide full-text data on CD/DVD in a standardized format on completion of every year with the search and browse capabilities in-built. They are also expected to help us install these CDs/DVDs on our servers so that the data could be used instantaneously as the need arises.

Besides, the INDEST-AICTE Consortium plans to take up activities that may not be associated either with the

purchase of e-resources or their usage but with completely different activities that require collaborative efforts and Consortium with its infrastructure can act as a catalyst. The Consortium would take up additional activities related to content creation, Some of the important activities that Consortium has initiated include:

- Setting-up interoperable electronic submission of theses and dissertations.
- Setting-up of interoperable institutional repositories in member institutions.
- Web-based Union Catalogue of Journals and other serial publications.
- Web-based Union Catalogue of Books.
- Cooperative Cataloguing of Internet-based e-resources.

Cross-subscription to e-resources with UGC-INFONET Digital Library Consortium is also proposed with financial support from the MHRD, i.e. subscription to INDEST-AICTE resources for universities and UGC-INFONET resources for technical institutions as well as for subscription to UGC-INFONET e-resources for colleges. The project proposal, jointly submitted by the two Consortia to the Ministry has been sanctioned.

Thus INDEST-AICTE Consortium, with its collective strength of participating member institutions, has attracted highly discounted rates of subscription coupled with most favourable terms of agreement. Consortium was offered very attractive prices from the vendors not only because of combined strength of its members, but also due to the eagerness of publishers to enter the Indian market. The rates offered to the Consortium are lower by 50 percent to 90 percent depending upon the category of institution. Moreover,

the rates have come down further with initiatives taken by the AICTE. The INDEST-AICTE Consortium, being an open-ended initiative is also planning to invite other institutions to join it for the benefits it offers. The consortium thrives on the strength of members it has. With increase in number of participating members the consortium would be able to get higher rates of discount for various resources and better terms of licenses.

11.5.20. UGC-INFONET Digital Library Consortium

The UGC-INFONET Digital Library Consortium, one of the largest consortium in India, was launched in December 2003 by Dr APJ Abdul Kalam, the then President of India to support education and research in universities. The Consortium provides current as well as archival access to 5,790 peer-reviewed journals and 10 bibliographic databases from 23 publishers and aggregators in different disciplines to academic community in universities comprising faculty, staff, researchers and students. These e-resources cover almost all subject disciplines including arts, humanities, social sciences, physical sciences, chemical sciences, life sciences, computer sciences, mathematics, statistics, etc. Besides, other subject areas like law, management, education, etc., are also proposed to be added in the near future. The Consortium subscribes to the entire collection or bundle of e-journals from most of the publishers included in the Consortium except for three publishers wherein the subscription is restricted to Cell Press and Current Opinion journals in the case of Elsevier's Science Direct, Library Science Collection in the case of Emerald, and Blackwell Journals in case of Wiley InterScience. The access to these resources is offered to 160 member universities based on their needs and activity profile as per the recommendation of the National Steering Committee. The Consortium is also planning to subscribe to Web of Science for its member universities.

Accessibility of Resources in UGC-Infonet Digital Library Consortium

The Consortium subscribes to 18 full-text e-resources and 10 bibliographic databases from academic societies, university presses, commercial publishers and aggregators. While all full-text resources subscribed by the Consortium contain electronic journals, bibliographic databases contain abstracts of articles published in journals, conference proceedings or chapters in books along with links to the full-text e-resources. The details of resources subscribed and accessible to the universities under the UGC-INFONET Digital Library Consortium are given in Table 11.14. Phase I in the last columns stands for first 50 universities that were given the benefit of access to e-resources in 2004, Phase II stands for next 50 universities that were included in the Consortium in 2005. Remaining universities were included subsequently in 2006-2007 under Phase III.

Table 11.14. Resources Subscribed and Accessible to Member Universities

S. No.	Electronic resources	URL Full-text Resources	No. of Jls.	No. of Univ.	Phase
1.	ACS	http://www.pubs.acs.org/	37	100	I&II
2	AIP	http:// www.scitation.org/	18	100	I&II
3.	APS	http:// www.scitation.org/	10	100	I&II
4.	Annual Reviews	http://arjournals.annual reviews.org/	33	100	I&II
5.	Blackwell	http://www3.interscience. wiley.com/	497	60	I&II
6.	CUP	http://journals.cambridge.org/	224	100	I&II
7.	Cell Press (Elsevier)	http://www.sciencedirect.com/	34	50	I
8.	Emerald-Lib. Sci.	http://iris.emeraldinsightcom/	29	60	I&II

9.	Institute of Physics	http://www.iop.org/EJ/	46	100	I& II
10.	Jstor	http://www.jstor.org/	1401	64	I&II
11.	Nature	http://www.nature.com/	1	50	I&II
12.	OUP	http://www.oxfordjournals.org/	206	75	I&II
13.	Portland Press	http://www.portlandpress.com/	8	50	I
14,	Project Euclid	http://projecteuclid.org/	36	50	I
15.	Project Muse	http://muse.jhu.edu/journals	411	100	I&II
16.	RSC	http://www.rsc.org/	29	100	I&II
17.	SIAM Journals	http://epubs.siam.org/	14	50	I
18.	Springer Link	http://www.springerlink.com/	1389	125	I-III
19.	Taylor & Francis	http://joumalsonline.tandf.co.uk/	1365	80	I&II
		Bibliographic Databases			
20.	JCCC	http://jccc-infonet.informindia.co.in/		150	I-III
21.	MathSciNet	http://www.ams.org/mathscinet/		50	I
22.	SciFinder Scholar	http://www.cas.org/SCIFINDER/SCHOLAR/index.html		20	I
23.	RCS Abstracts and News Bulletin	http://www.rsc.org/Pubiishing/		100	I & II

Access to electronic resources is IP-enabled for the member universities. Users in member universities do not require "Login ID and Password" to access resources accessible to their universities, instead, the resources are

accessible to them from anywhere on their Campus network. Currently, the Consortium is working on Shibboleth-based access management technology with an aim to provide off-campus access to e-resources to day-scholars as well as to faculty from their homes or when they are travelling.

The UGC-INFONET Digital Library Consortium covers almost all areas of learning that are pertinent to courses offered by member universities including, Arts and Humanities, Social Sciences, Physical and Chemical Sciences, Life Sciences, Computer Sciences, Mathematics, Statistics, etc. Subject-wise distribution of journals available through the Consortium is given in Table 11.15.

Table 11.15. Subject Coverage of the Journals

Subjects	Number of Journals
Computer Science, Information & General Works	446
Philosophy and Psychology	438
Religion	102
Social Sciences	2045
Language	205
Science	1875
Technology	1252
Arts and Recreation	392
Literature	273
History and Geography	947

Membership

The UGC-INFONET Digital Library Consortium has the following two types of members:

Universities Under Purview of UGC : One hundred and eighty five universities including 14 new Central Universities,

Inter-University Centres of the UGC, and Deemed Universities under direct purview of UGC, are entitled for getting e-resources through the UGC-INFONET Digital Library Consortium. Of 185 universities, 160 universities that have been given Internet connectivity under the UGC-INFONET Connectivity Programme, are being provided differential access to e-resources. Remaining 25 universities will be covered in the near future. However, some of these universities are highly specialized dealing with subjects like Urdu, Sanskrit, Hindi, and Law, etc. As such, these universities do not have much use for e-resources that are being offered through the Consortium.

Associate Membership Programme : Its "Associate Membership Programme" was launched in 2009 with an aim to enroll private universities and other institutions as members and to extend benefits of access to e-resources at the same rates of subscription that are being offered to the core member universities. The Associate Members are required to pay an annual fee of Rs 5,000 in addition to subscription fee for e-resource that they wish to subscribe. Associate members are free to choose any resource they wish to subscribe. Forty private universities and other institutions have already joined the Consortium in the first year itself. Several universities and other institutions are willing to join the Consortium in the near future.

Committees, Participating Institutions and their Roles

The UGC-INFONET Digital Library Consortium is being operated by the INFLIBNET Centre under the overall guidance of a National Steering Committee constituted by the UGC that guides and steers the activities of the Consortium. The National Steering Committee (NSC) is responsible for taking policy decisions as well as for execution of the scheme. The Committee takes decision on e-resources to be subscribed from various publishers and their

accessibility to beneficiary universities. NSC comprises of members from participating universities (one each from Central, State, and Deemed universities), nominee of Governing Board of INFLIBNET Centre, nominee of university from North Eastern Region, nominee of Inter-university centres, IITs/IISc/Institutions of higher learning and Coordinators of CSIR E-Journals Consortium, and INDEST-AICTE Consortium. Director, INFLIBNET Centre is Ex-officio Convener of the NSC and Chief Coordinator of the Consortium.

Besides NSC, a Negotiation Committee (NC) has also been constituted for negotiating rates of subscription to e-resources with publishers, The NC has two members, each nominated by the Chairman, NSC and Chairman, Governing Board of the INFLIBNET Centre. Coordinators of the CSIR E-Journals Consortium and INDEST-AICTE Consortium are Ex-officio members of the NC. The NC also has representatives from the INFLIBNET's Finance and Store Units. Director, INFLIBNET Centre is Ex-officio Chairman of the NC.

The INFLIBNET Centre acts as a nodal agency for implementation, monitoring, and execution of the entire programme through the committees mentioned above. It coordinates all activities concerned with negotiation, renewal of subscription to e-resources, and attending to subsequent troubleshooting on behalf of the Consortium. The NSC also promotes cooperation amongst member universities and facilitates better terms of references for use and preservation of subscribed electronic resources.

License Agreement and Fair Use

The terms and conditions of subscription and access to electronic resources available through the Consortium are governed by license agreements that are signed between

the Consortium and publishers by the INFLIBNET Centre on behalf of its member universities. The UGC-INFONET Digital Library Consortium has laid down a number of terms and conditions that the publisher should agree. While the Consortium signs the license agreement prepared by the publisher, care is taken to incorporate terms and conditions mentioned below for as many publishers as possible.

Simultaneous Users : There is no limit on number of simultaneous users on any of the resources subscribed by the Consortium. Any number of users can access e-resources including e-journals and bibliographic databases at any given time. Walk-in users who are physically present at the subscribing university should also be allowed to use the resources.

Print-independent Subscription : Subscription to e-resources is print-independent. As such, beneficiary universities are free to drop subscription to print copy of journals accessible to them through the Consortium.

Inter-library Loan (ILL) : Licensee is allowed to fulfill ILL requests from non-authorized users using print copy of article downloaded from the licensor's website.

Usage Statistics : Publisher is required to submit 'COUNTER' compliant usage / statistics on number of downloads (both full-text and abstracts) in a given month, previous month and cumulative for one year.

Inclusion of Additional Titles : The publisher would provide access to new journal titles that are added during the contract period at no additional cost.

Electronic Link : Publisher may provide electronic links to the licensed materials from Licensee's webpage at journal level or at article level and publisher should provide help in doing so.

Print Copy of Journal : Publisher should provide a print copy of each journal – if agreed in license agreement, to the INFLIBNET Centre.

Protection on Increase of Price : The Publisher would provide protection on increase in price of subscribed resources. The increase should not be more than 5 percent.

Perpetual Access and Archival Rights : In case of termination of the Agreement or on the expiry of the agreement, publisher would extend perpetual access to e-resources for the paid period of subscription along with their backfiles offered during the subscription period. Alternatively, the publisher would provide full-text of e-resources with back volumes for e-journals/e-databases, for each year on prevalent formats, i.e., CD-ROM/DVD-ROM with the retrieval software for access on the network. In case of change in archival technology, the state-of-the-art archival technology shall be made available by the Licensor to subscribers at no extra cost for archival of full-text data of e-journals to higher version of technology.

Awareness and Training : The publisher or its representative would conduct "Users Awareness Programme" on campuses of member universities at no-charge to the universities. The publisher would provide publicity material, brochures, posters and user-support materials in both print as well as on CD forms.

E-print Archive : Member universities would be allowed to download bibliographic records, abstracts and full-text articles published by their faculty, researchers, students and staff from publisher's site and import them in to their local database and Institutional Repositories.

All disputes arising under the Agreement shall be settled under the rules of the International Arbitration Court by one or more arbitrators in accordance with the said rules. The

place of the arbitration shall be in New Delhi (India) and carried out in the English language.

Analysis of Usage

Most publishers maintain detailed usage statistics compliant to an international standard called "COUNTER" for resources offered by them to the Consortium. The INFLIBNET Centre, as the agency responsible for implementation of Consortium, collects comparative statistics of usage of e-resources by the member universities on regular intervals from publisher's site and makes it accessible to them through INFLIBNET website. A custom-made web interface called e-RAMS (Electronic Resource Access Management System) has especially been designed to provide and deliver statistics of usage to member universities. The publishers also provide User ID and Password to the member universities for accessing the statistics of usage of their resources directly from publisher's website.

The comparative usage of various resources through 2005 to 2008 is given below in Fig. 11.4. The figure reflects consistent increase in usage from 2005 to 2008 for all e-resources. The average increase in usage from 2004 to 2008 is 55.74 percent.

Economics of UGC-infonet Digital Library Consortium

The factors that determine economic viability and cost-effectiveness of consortia-based subscription to e-resources are– its membership, intensity of usage, successful migration from print to electronic version – with discontinuation of print, and cost avoidance. These factors are discussed below in detail.

Number of Members : The member universities to the UGC-INFONET Digital Library Consortium were added in a

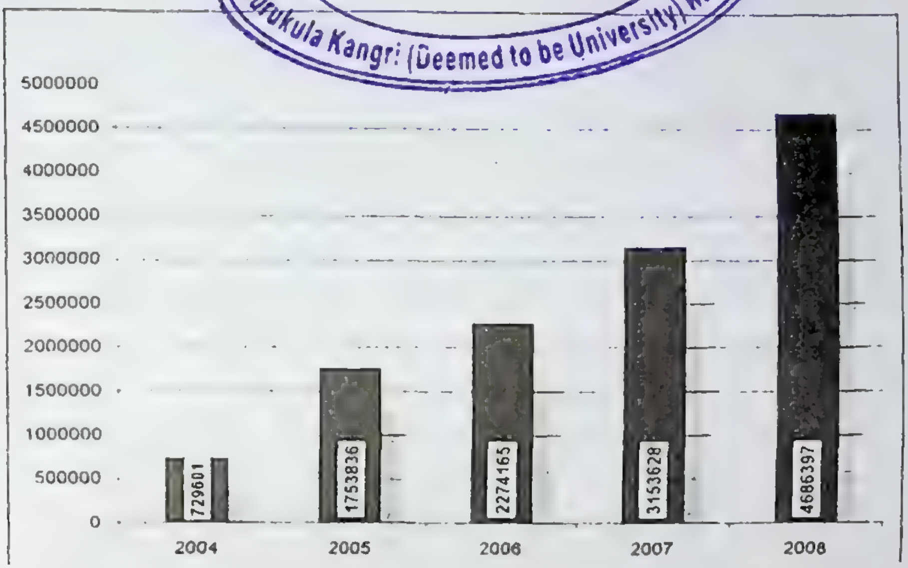


Fig. 11.4. Year-wise Increase in Downloads of Full-text Articles by All Member Universities

phased manner. While subscription was paid for only the first 50 universities in Phase-I in 2004, additional 100 universities were added in a span of next two years, i.e. 50 universities in 2005 (Phase II) and 50 universities in 2006 (Phase III).

The Consortium currently benefits more than 160 universities. Membership of the Consortium has potential to grow up to 500 including 185 core universities, covered under the 12 B Act of the UGC, and 315 private or deemed universities and other institutions which can join as Associate Members. The Consortium has attracted the best possible price and terms of agreement from the publishers for universities in three different phases (Phase I to Phase III). The rates of subscription to e-resources for most publishers are comparatively higher for first 50 universities covered in Phase I. However, rates of subscription are lower for universities in Phase II and lowest for universities in Phase III.

Cost Avoidance : The Consortium, with its collective strength of participating universities, has attracted highly discounted rates of subscription coupled with most favourable terms of agreement. In effect, the members of the Consortium avoid the cost commitments on the following:

Lower Rates of Subscription : The Publishers offered 50 per cent to 95 percent lower rates of subscription to the Consortium for member universities. The rates were further lowered as additional number of universities were added to the Consortium. The lower rates of subscription are offered to the Consortium from the vendors not only because of combined strength of its members, but also due to the eagerness of publishers to enter the Indian market.

Annual Increase in Rates of Subscription : There is an annual increase of 10 percent to 15 percent of subscription rate of resources. However, Consortium has negotiated the rates of increase in price of the e-resources and fixed the price cap within 4-5 percent annually. Some of the publishers have offered rates of subscription without annual increase in subscription rates up to 2012.

Average Cost of Journals Subscribed in the Consortium: The Consortium provides differential access to 5,790 journals to 160 member universities at a total cost of Rs 42.00 crore for 2009. Average cost of single journal computes to Rs. 712.75 after considering the fact that all universities do not get access to all journals.

Intensity of Usage : The intensity of usage of e-resources can essentially be judged in terms of number of articles downloaded by users of member universities. It can essentially be described in terms of average cost of articles and cost recovered as elaborated below. "Cost Recovery" and "Average Cost of article per download" can be used effectively to judge cost effectiveness of e-resources. These factors reflect the intensity and frequency of usage of e-

resources by member institutions in a Consortium.

Average Cost of an Article/Bibliographic Record : The average cost of an article reflects frequency of its usage. It is calculated by dividing subscription cost of a resource by the number of articles downloaded. The average cost per article is lowest for *JSTOR* (Rs 6.16) and highest for Cambridge University Press (Rs 292.66), whereas the Consortium average is Rs 75.95.

Cost Recovery : The cost recovery factor calculated by multiplying number of articles downloaded with the cost of a single article, if it is purchased directly from the publishers in the pay-per-view model or bought from a document delivery service. According to ALPSP survey, 78 percent of publishers surveyed offer pay-per-view or individual article purchase options. In the pay-per-view model the cost of articles varies from publisher to publisher; average cost is $ 30 per article. Assuming that if the electronic resources were not available through the Consortium, articles downloaded from these resources by the member institutions would have been sourced on ILL/document delivery service at a cost of US $15 per article.

Cost Savings : The UGC-INFONET Digital Library Consortium, as a policy, has subscribed to print-independent e-resources, which essentially means that member universities are free to drop subscription to journals that are made accessible to them through the Consortium arrangement. Moreover, beneficiary universities are free to drop print subscription to e-resources for which electronic access is available through the Consortium. The Centre enquired from all the 100 member universities about the droping of the print subscription. Sixty member libraries responded to the request where 31 member libraries have filled the specific question about the discontinuation of the subscription. So, the figure reaches to around Rs 3.7 crore

on account of drop-in print subscription by the universities. It is presumed that the total savings made on this account would be equivalent to the expenditure incurred on subscription to e-resources through the Consortium.

Effective Implementation Strategies

As the funds required for subscription to electronic resources for all the universties are met by the Government, it is imperative to take steps to ensure optimal utilization of e-resources in all member universities. Some of the important steps taken in this regard are as follows:

Internet Connectivity through UGC-INFONET : The decision to provide access to electronic resources to universities was taken by the UGC in the year 2003. However, it was realized that the Internet connectivity, a pre-requisite for extending access to e-resources, is not available in most of the universities. To implement the programme, INFLIBNET took the initiative by providing connectivity to universities under the project called UGC-INFONET. So far 160 universities have been provided Internet bandwidth ranging from 2 Mbps to 10 Mbps. Fourteen more universities covered under 12B Act of UGC has recently been identified for inclusion under the scheme. ERNET India is the Internet Service Provider for the members of UGC-INFONET. The Centre is currently contemplating to provide greater Internet bandwidth to member universities under the UGC-INFONET Programme.

Comparative Usage Analysis by Member Universities: The INFLIBNET Centre compiles detailed statistics of usage of e-resources by member universities. Each university is ranked based on their usage of e-resources. The rank assigned to universities based on usage of e-resources is often used as a measure of their scholarly performance. Comparative usage statistics of universities covered under

scheme is made accessible to the universities. Universities with lower usage are urged to increase their usage.

Promoting Use of e-Resources : The Consortium needs to take steps to promote usage of subscribed resources amongst the member universities. The UGC-INFONET Digital Library Consortium has taken the following steps to promote use of e-resources[6].

Consortium Website : The INFLIBNET Centre maintains a separate, dedicated website (http://www.inflibnetnet.ac.in/econ/) for the Consortium. The website provides detailed information about the Consortium including (i) search and browse interface for more than 5,000 journals covered under the Consortium; (ii) classified index to journals covered under the Consortium; (iii) search interface for member institutions and e-resources accessible to each one of them; (iv) E-resources Access Management System (E-RAMS) designed to provide access to usage statistics to member universities and for monitoring their complaints; (v) detailed tutorials on each e-resource; (vi) licensing and fair use of e-resources; (vii) associate membership programmes and information on how to join the Consortium; and (viii) guidelines for the UGC-Infonet Digital Library Consortium.

Users Awareness Training Programmes : Users Awareness Training Programme is a crucial requirement a consortium has to fulfill to facilitate optimum use of subscribed electronic resources. Training programmes act as a bridge to facilitate better communication amongst members of consortium and find answers to common problems. Such programmes are essential both for the users as well as for the library staff would make users competent to conduct their own searches more effectively. The Consortium provides financial assistance to member universities for conducting one or two-day user awareness programme with an aim to increase usage of various e-resources. These programmes

help faculty members, research scholars and students to get acquainted with resources, their features, functionalities, and advanced options.

Specialized Publications : INFLIBNET Centre, as nodal agency to execute the Consortium, prepare, design, print and distribute posters, brochures, and user's manual amongst member universities. Moreover, soft copies of these tutorials are also made available through the Consortium website. The website also provides links to web-based tutorials available for these resources on publisher's website. The Centre has also published a Compendium for member universities that provides detailed guidelines on effective and efficient use of electronic resources. This Compendium contains tutorials on each resource subscribed by the Consortium.

Annual Meets: CALIBER and PLANNER : Besides, training programmes, the INFLIBNET Centre organizes two major annual conventions every year, namely CALIBER and PLANNER. Both the conferences are used as a platform to discuss and deliberate on various issues related to effective use of e-resources. Now these events are being organized at alternate years.

Usage Monitoring and Web-based Support for Troubleshooting : INFLIBNET Centre, as an agency for implementation of the Consortium, has also developed E-RAMS (Electronic Access Management System) that (i) helps users to lodge their complaints and offer their comments regarding usage of e-resources; (ii) facilitates publishers to record action taken on the complaint; (iii) view or track status of complaint made by member universities; (iv) facilitate systematic hosting and delivery of statistics of usage of e-resources to member universities; and (v) facilitate users to view IP ranges communicated to the publishers for accessing e-resources.

Copyright and IPR Issues : Several publishers block

access to their e-resources in case of excessive and systematic download of articles causing interruption in access to their e-resources. It is, therefore, imperative that the users as well as librarians are sensitised on issues of licenses and agreements that consortium signs with the publishers. Users need to be told what, as an authorized user, they are allowed and what they are not. While most of the publishers allow ILL, electronic delivery of articles are not allowed. Similarly, while there is no limit on number of articles that can be downloaded from a resource, systematic downloading of articles is not allowed. Issues of copyright and license agreements are addressed in detail on the Consortium website. The issue of copyright and licensing issues are also addressed during the users awareness programme to ensure un-interrupted access to e-resources.

Web 2.0 Technologies for Promotion and Support : The INFLIBNET Centre has developed and installed RSS Feed Aggregation Service on its website (http://www.inflibnet.ac.in/feed/). This Service facilitates RSS links to open on the website of the Centre for all electronic journals that are covered in the Consortium and have option for RSS feeds. Resultantly, the users, instead of copying RSS feeds into their RSS Feed Readers, can visit the INFLIBNET website and read the current contents of desired journals subscribed under the Consortium. These RSS feeds are arranged according to subject categories as well as alphabetically. Moreover, journals covered under the RSS Feed Aggregation Services can also be searched according to the subject category and by words in journal titles.

INFLIBNET has also developed Toolbar that facilitates easy access to e-resources and other important links on their website. Recently a new version of Toolbar is launched by centre after a positive response from the users.

Facilitating Communication among Member Universities : Continuous communication amongst members of a consortium is considered its life-line, Effective communication motivates members to cooperate, commit to the cause of consortium and align members toward a shared vision. Continuous communication is necessary to link each member with the practices of the consortium and to involve them at policy and operational level as a team. The Consortium promotes communication at the following levels:

Mailing List : The Consortium is required to keep a close liaison with its members. It requires feedback and information from its members regularly and at times urgently. A mailing list with archival facility was made operational at the INFLIBNET Centre to facilitate communication amongst members of the UGC-INFONET Digital Library Consortium. All technical and administrative contacts of each member institutions are members of the E-mailing list (e-consortium@inflibnet.ac.in). The mailing list can be subscribed by any person in a university which is the member of the Consortium. The Consortium maintains a comprehensive website (http://www.inflibnet.ac.in/econ/) that is kept updated regularly.

INFLIBNET Chat : The INFLIBNET Centre has recently developed its own chat-room services using PHP for extending proactive support to the users. The users can log on to www.inflibnet.ac.in/chat or click on "Online chat' at the home page of INFLIBNET's website and enter into a chat session with dedicated and qualified team of professionals for resolving their problems in a real-time mode.

Besides, the INFLIBNET Centre through its annual events, CALIBER and PLANNER, establish contacts with members of the Consortium. Moreover, J-gate Custom Contents for Consortium (JCCC), designed especially for the Consortium, facilitates resource sharing amongst member

institution and serves as a media to increase communication amongst members.

The immediate future endevour of the UGC-INFONET Digital Library Consortium, is to launch college model of the Consortium under a joint project entitled "National Library and Information Services Infrastructure for Scholarly Content (N-LIST)" sanctioned to the INFLIBNET Centre and IIT Delhi by the Ministry of Human Resource Development (MHRD) under its National Mission on Education through ICT. The project provides for cross-subscription to e-resources, i.e., subscription to INDEST-AICTE resources for universities and UGC-Infonet resources for technical institutions as well as for subscription to UGC-INFONET e-resources for colleges. The project has been sanctioned and the Ministry has released the requisite funds for the joint project. Under the project, individuals – including students, researchers and faculty, from colleges and other beneficiary institutions would have direct access to e-resources through servers installed at the INFLIBNET Centre. The authorized users from colleges would be able to access e-resources and download articles required by them directly from the publisher's website once they are duly authenticated as authorised users using technologies being deployed for this purpose.

The INFLIBNET Centre, Ahmedabad is also responsible for developing and deploying appropriate software tools for authenticating authorized users. Though most publishers of online digital content supports IP filtering and password-based authentication to provide access to their electronic resources, there are several other technologies and protocols that are in vogue for authenticating users to access and operate upon digital materials irrespective of their log-in location. Such technologies include Web proxies, Shibboleth, Referring URL, Kerberos, etc. All such access management technologies are being examined with an aim to adopt

authentication technologies that facilitate seamless access to e-resources to colleges that do not have static IP addresses. The Centre would also monitor usage of e-resources with an aim to check misuse or trouble shooting faced by beneficiary colleges.

The INFLIBNET Centre, Ahmedabad is currently evaluating the availability of ICT infrastructure in Govt/ Govt-aided colleges and eligible colleges are being asked to submit list of authorized users including faculty, researchers, and students. Trial access to selected e-resources has already began and its details are available on website at http://www.inflibnet.ac.in/n-list/. Colleges eligible for the scheme (12 B/2 F) are invited to register online by filling the Registration Form.

Besides, the Consortium proposes to add more resources, especially in social sciences, education, law, management, etc. Based on the demands from user community in universities, it is proposed to subscribe to additional resources from publishers like Wiley InterScience, Science Direct, Emerald Management Xtra, and Sage Publications. The Consortium plans to strengthen and expand its "Associate Membership Programme" with inclusion of additional e-resources at lower rates of subscription so as to encourage private universities and other institutions to join the Consortium and subscribe to e-resources of their choice on payment basis.

So, it is seen that the UGC, through the INFLIBNET Centre, has successfully infused a new culture of electronic access to scholarly information amongst academic community in universities through its initiative the "UGC-Infonet Digital Library Consortium", which provides access to selected scholarly electronic journals and databases in different disciplines. With launching of N-LIST programme, e-resources accessible to universities only, are now being

made accessible to colleges also. These programmes would certainly benefit the higher education system in India immensely.

Lastly, it can be said consortia are becoming popular but some E-structuring of the University Library and Information System is needed to suit the requirements warranted by the modern ICTs. It is felt that the modern ICTs warrants total changes in the processes of acquisition, technical processing, user education, services, human resource development (HRD), financial management, etc. of the university libraries. It is visualized that, the consortia based operations and electronic document delivery services of the libraries will enhance this need for thorough re-structuring. In comparison, it is revealed that similar situation prevails in almost all universities in India and the findings are relevant to them also.

Re-engineering the User Services : The work of user services has to be thoroughly re-engineered on the lines of consortium and electronic document delivery. The procedures for all user services such as compilation of bibliographies, current awareness service, selective dissemination of information, photocopying, other documentation services, CD based and online database services, etc. has to be re-defined and need total revision.

Re-engineering the User Education : The user education programmes need to be more technology oriented. Such programmes should be able to impart minimum theoretical practical knowledge on computers, printers, scanners, network based systems, search software of different database vendors, Internet search engines and services, web browsing, downloading, e-mail, data copying to CDs and DVDs, multimedia applications, computer viruses, etc. The orientation and training should be designed in such a way to provide confidence in locating and using the required

and authentic information easily.

Re-engineering the Human Resource Development : The aspect of re-engineering with regard to the human resource development is mainly concerned with the areas of staff selection, orientation, training, technology adoption, work study, change management, motivation, etc, The technologies, methods and procedures, used in the library and information systems are more dynamic and changing as compared to many of the other professions. But, on the contrary, it is experienced that a large number of library and information professionals were reluctant to change. This also contributed to the low performance in the profession. This situation stresses the need for a total revision of the HRD policies of the LIS.

In order to prepare professionals and other staff in the libraries, Continues Education Programmes (CEP) should be conducted regularly. The course contents and conduct should be evaluated and reviewed frequently. The compulsory orientation and refresher courses conducted by the UGC for the library professionals / teachers in the UGC Cadre have helped to improve the situation. Information scientists working in University libraries for computerization programme should also be given chance to update their knowledge through such programmes. But, it is evaluated that the conduct of the UGC refresher courses in many of the universities is downgraded to that of a routine process. Lack of infrastructure and latest technology systems, non-availability of competent and experienced faculty, inadequate interest in participants, etc. are some reasons for this situation.

The CEP has also to be provided for the professionals below the UGC cadre, that is, semi-professionals and the non-professionals, because, every staff in a library has important role in winning performance.

Moreover, in modern libraries, the stress will be on

electronic resources. So, more money has to be set apart for purchase and maintenance of hardware and software systems, Internet connectivity, etc. than the conventional pattern of spending for large buildings, furniture, books, journals, binding, etc. Moreover, in consortia system, lot of work of acquisition, processing and services will be centralized. Hence, a substantial portion of the fund will have to be either deviated or pooled for consortium This will need revision in budget process and financial management.

11.6. ROLE OF NATIONAL LIBRARY IN LIBRARY CONSORTIA

National Library of India is the apex center in the National library system. The National library is considered to be the national depository center for all the publications published in India, including Government of India publications. Hence, National Library should have a mandatory objective in acquiring, conserving and distributing all the information resources under its control by establishing a viable and active mechanism of co-operation between the National Library and the Government agencies and the entire publication system to disseminate the information at the earliest possible time. When compared to the National Libraries of the other countries, IT application in our National Library is inadequate in making the library services effective. There is much to do in the area of database creation, networking the public library system in the country and working out the strategy for conserving the rich cultural heritage of the country. Therefore, there is an urgent need for modernization of the National Library of India to withstand the test of the time and maintain the identity of its existence as a centre of National Wealth. The humble efforts of the National Library in launching a programme of converting millions of bibliographical records into MARC 21 format will be a giant step towards the faster dissemination of valuable information. In addition to this, the

networking of libraries and their resources especially of the government organizations would be helpful and would satisfy a great deal of long cherished demand of the users community both in India and abroad. In order to cope up with the diversities of languages and different types of bibliographical records including the diversified cultural heritage of the nation, it is essential on the part of National Library to go for digitization programme so as to be able to disseminate the conserved and organized information for the longer good of the community.

Even now, there has been no systematic effort to formalize the structuring of consortia, or to standardize vital aspects of their operation, such as governance and the establishment of intellectual property, policies and procedures. Today, consortia have got momentum, due to the explosion of Internet – at least from mid-1990s. After the Internet and the World Wide Web had taken firm hold, the stage was set for an even broader resurgence of standard setting, since a means is already existing hereby anything could be connected to everything, and the commercial motivation to participate with better capability became extreme. Not surprisingly, a diverse array of consortia is being created to address the telecommunications, software, wireless and other aspects of this new opportunity, and in the start of this decade, many consortia were established and some were merged. Many more consortium model will presumably continue to evolve, despite the current prevalence of a myopic focus and lack of proper introspection. Whether that evolution will be deliberative and productive, or reactive and erratic, one has to wait and watch.

Further, while developing consortia, one has to be vigilant about how the E-Resources and its marketing strategies are developed, the strategic choices now being faced by consortia, publishers and intermediaries, and where finally they are likely to lead. All involved seem to recognize

that in this new electronic market, there are many opportunities than threats and professionals can identify the emerging challenges and benefits to their own organizations. The impact of consortia particularly on journal packaging and pricing, in an increasing scale of the operation by main players, namely publishers both large and small, intermediaries and agents has to be in constant watch. In future, new roles need to be played by the national apex library, to identify, from time to time, changes that take place in opportunities and challenges of the current corporate integration, the new publishing models, as to whether consortia can really can survive and flourish in such a complex world.

Consortia are predominantly concentrating on online journals that promote academic library consortia, academic multi-site institutions and corporate multi-site customers worldwide. The consortia can agree on a list of online journals in any field like arts, social science, scientific, technical, medical, professional and humanities disciplines. The success of consortia only depends on the choice for participating centers to choose either complete online collection or a subject-based collection or select sub-set of the online collection. In case of site-wide access via institution's secure network, or remote access for valid IP addresses accessed through their network with a modem link, or via a proxy server is very helpful. Libraries expect from the providers for a commitment on perpetual access to journal content that they subscribe to, or have previously subscribed to via their preferred gateway. Considering future of consortia, as national a depository center, it needs to take the form of electronic portals for national information , or a national portal, or national gateway for information.

Summing up, in reaping benefits of the modern ICTs, the library and information centres in India are far behind as compared to those in the developed nations. Inadequate fund, infrastructure, manpower training, unscientific rules and

management policies, etc., are the reasons for this situation. Uneven distribution of the available resources causes wide disparity in information availability, access and use. Gaur has rightly indicated the need for proper management models suitable for the modern ICT environment as follows. "It is important to find out why Indian Libraries and Information Centres have not been able to benefit to the extent expected by the computer revolution in spite of huge investments, and with so much of hue and cry. ... But, in reality all these effort have gone as waste. Why is it so?. Are these efforts not in proper direction ?. Or is there something wrong in our planning? In this process there will be a need for models and frameworks that help us to understand and identify specific problems".

The advent of electronic journals and online databases coupled with high speed data communication facilities has paved the way for the present form of library consortia. The model of single library consortia, proposed for the whole country, can bring an ideal situation of information availability and use, which provide maximum economy and service efficiency. But the attention is needed to induct and motivate the library communities towards the technology-driven coalition policies for better access to e-resources and to take up the challenges of 21st century. We firmly believe that all these will be possible, if the library community is able to grasp the importance of cooperation or partnership among the libraries, as quoted by N. R. Narayana Murthy from a hymn of Vedas-

> "Man can live individually, but can survive only collectively. Hence, our challenge is to form a progressive community by balancing the interest of the individual and that of the society. To meet this we need to develop a value system where people accept modest sacrifices for the common good".

12
E-Learning and Digital Libraries

Globalization has resulted in many new challenges for present education system. The products of the educational institutions should be able to face the challenges of modern industry due to advancement of digital technology. Up-to-date technical know-how, willingness and enthusiasm to learn new technology are the needs of the present growth in this era of information technology.

Education technology is a systematic way of designing, implementing and evaluating, learning and teaching. The national boundaries are loosing meaning due to Internet. The methods of learning and teaching have to be updated and modernized. The teaching methodology and present day classroom management have to undergo major changes to cope up with the cyber age. In view of the above, it is necessary to consider the establishment of virtual institutions in engineering and e-education technology in the present global vision. There is a need of technologically enhanced all education using Internet as well as other multimedia applications to cope up with the emerging scenario. The electronic communications and computers in the information society have impact on continuing education as well as industry – institute interaction for better achievements in these fields. Fig. 12.1 shows information revolution in digital global world.

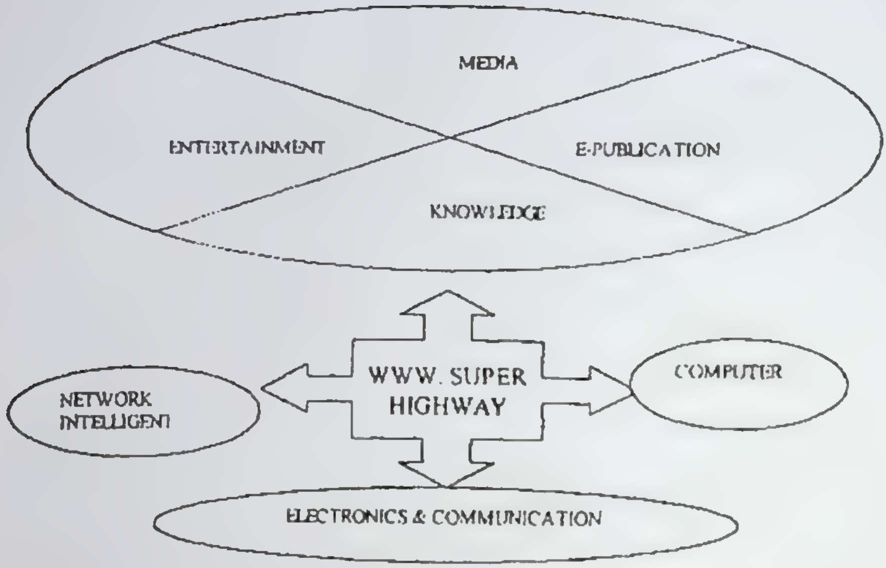


Fig. 12.1. Information Technology

In this digital global world e-learning has emerged as one of the fastest moving trends in higher education. Global information super highway has opened the teaching of courses over the web. This mechanism of online learning is like a logging on to the Internet to run most e-learning software a Pentium based PC with latest multimedia technology and recent version of the window is needed. Fig. 12.2 shows the convergence of computer and communication technology for e-education system.

E-education is a form of distance learning, which uses the electronic media, where a distance separates teachers and learners. It is transmitted in the form of voice, data, video and print etc. Convergence of video and data is blurring the boundaries in this globe. A large number of students can register for higher education using this technology. Fig. 12.3 shows the basics in the e-education technology which has the following advantages:

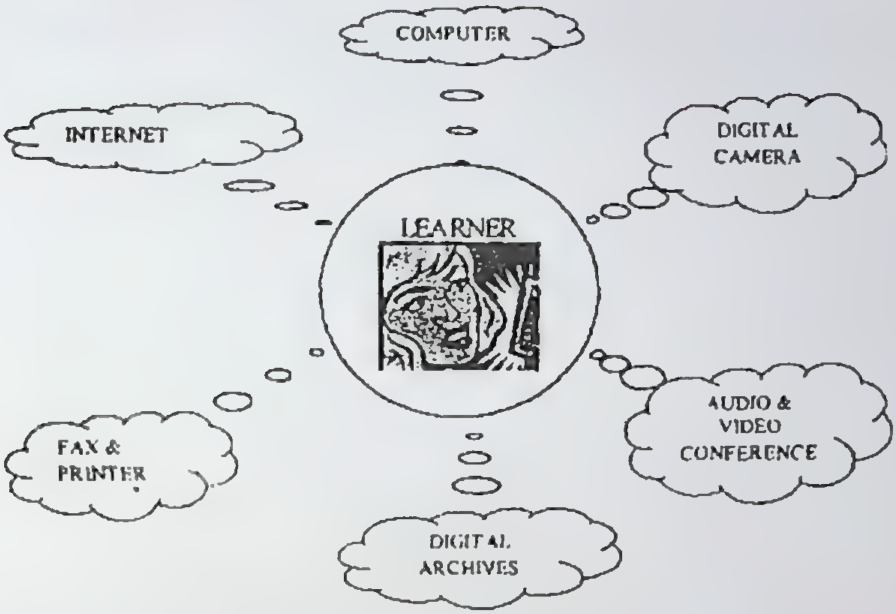


Fig. 12.2. Online Learning

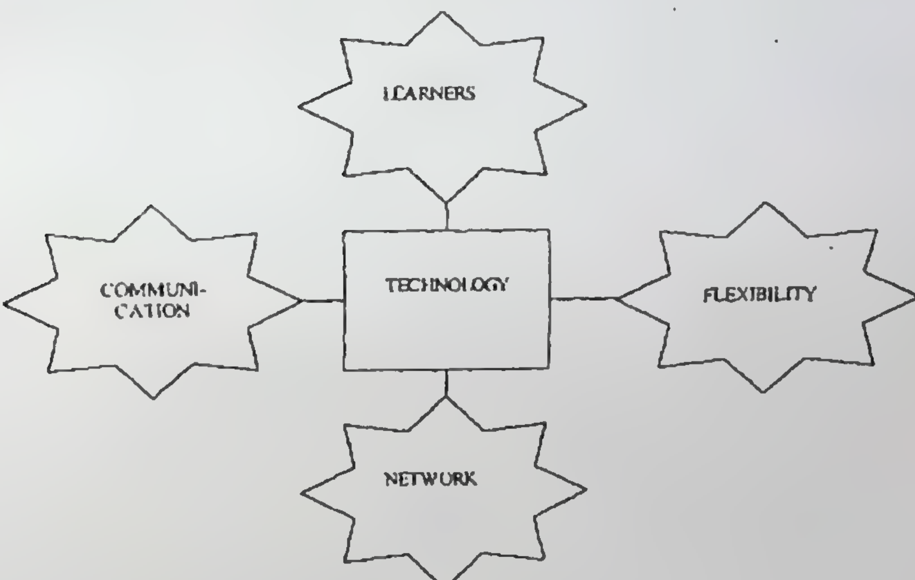


Fig. 12.3. Information of E-education

– More flexibility for learners in term of place, time and need.
– Learner may update latest technical know-how.
– Learner may share resources.
– There is increased communication in this technology.

The advancement in computer communication as well as information technology has provided access for world wide exchange of information. There is abundance of knowledge and information due to global connectivity. Intelligent networks are capable of transmission of information – data, voice, images etc., from one point to another point with reliability and security.

Learning today could be supplemented by new techniques based on data communication technology between teachers and the students. Distance learning between experts and learners has made learning process independent of location. E-learning is an approach to facilitate and enhance learning through both computer and communications technology. Such devices can include personal computers, CD-ROMs, Digital Television, P.D.A.s and Mobile Phones. Communication technology enables the use of the Internet, e-mail, discussion forums, collaborative software and team learning systems.

12.1. E-LEARNING TERMINOLOGY

Different terminologies have been used for e-learning, a fact that makes it difficult to develop a generic definition. Terms that are commonly used include online learning, Internet learning, distributed learning, networked learning, tele-learning, virtual learning, computer-assisted learning, web-based learning and distance learning. All of these terms imply that the learner is at a distance from the tutor or instructor; that the learner uses some form of technology,

usually a computer to access the learning materials; that the learner uses technology to interact with the tutor or instructor and other learners; that some form of support is provided to learners, etc.

E-learning is the term used to describe teaching and learning resources or experiences that are, in some way, delivered electronically. E-learning is meant to be more than just educational websites or computer software. It includes all aspects of electronic delivery-watching an educational video, using a digital camera, using a computer to edit pictures, texts or sounds for a presentation or project, or using an interactive whiteboard in a lesson can all be considered implementations of e-learning.

There are many definitions of e-learning in the literature, definitions that reflect the diversity of practice and associated technologies. Carliner defines e-learning as educational material that is presented on a computer. Khan defines online instruction as an innovative approach for delivering instruction to a remote audience, using the Web as the medium. However, e-learning involves more than just the presentation and delivery of the materials using the Web – the learner and the learning process should be the focus of e-learning. According to Anderson, the e-learning is :

> *"The anytime, anywhere, characteristics of e-learning tools, and the fact they are available from devices including desktops and notebooks, can also accelerate the productivity gains by making education more accessible. Indeed e-learning could be regarded as improvement on the delivery of open and distance learning"*

Elliott Masie defines e-learning as :

> *"the use of network technology to design, deliver, select, administer, and extend learning'.*

Robert Peterson and Piper Jaffray define e-learning as:

> *"as those that leverage various Internet and Web technologies to create, enable, deliver, and/or facilitate lifelong learning."*

CISCO systems define e-learning as:

> *"Internet-enabled learning. Components can include content delivery in multiple formats, management of the learning experience, and a networked community of learners, content developers and experts. e-learning provides faster learning at reduced costs, increased access to learning, and clear accountability for all participants in the learning process. In today's fast-paced culture, organizations that implement e-learning provide their work force with the ability to turn change into an advantage"*

While OCLC e-learning Taskforce states that *e-learning no longer applies merely to distance learning but also to more traditional courses that have incorporated electronic elements into the day to day teaching and learning process.*

In nut shell, e-learning is defined as, "The use of the Internet to access learning materials; to interact with the content, instructor and other learners and to obtain support during the learning process in order to acquire knowledge, to construct personal meaning and to grow from the learning experience."

12.2. TYPES OF E-LEARNING

There are two types of e-learning – asynchronus and synchronus learning.

Asynchronus e-learning, commonly facilitated by media such as e-mail and discussion boards, supports work relations

among learners and with teachers, even when participants cannot be online at the same time. It is thus a key component of flexible e-learning. In fact, many people take online courses *because* of their asynchronous nature, combining education with work, family, and other commitments. Asynchronous e-learning makes it possible for learners to log on to an e-learning environment at any time and download documents or send messages to teachers or peers. Students may spend more time in refining their contributions, which are generally considered more thoughtful compared to synchronous communication.

Synchronous e-learning, commonly supported by media such as videoconferencing and chat, has the potential to support e-learners in the development of learning communities. Learners and teachers experience synchronous e-learning as more social and avoid frustration by asking and answering questions in real time. Synchronous sessions help e-learners to feel like participants rather than isolates:

> Isolation can be overcome by more continued contact, particularly synchronously, and by becoming aware of themselves as members of a community rather than as isolated individuals communicating with the computer.

The debate about the benefits and limitations of asynchronous and synchronous e-learning seems to have left the initial stage, in which researchers tried to determine the medium that works "better"–such studies generally yielded no significant differences. Consequently, instead of trying to determine the best medium, the e-learning community needs an understanding of when, why, and how to use different types of e-learning. The users decide how to use a medium. For example, in some instances e-mail is used near-synchronously when users remain logged in and monitor their e-mail continuously. Thus, the difference between

asynchronous and synchronous e-learning is often a matter of degree.

12.2.1. Three Types of Communication

Haythornthwaite in 2004 mentions in *Educause Quarterly* (4: 51-55), that three types of communication in particular are important for building and sustaining e-learning communities – content-related communication, planning of tasks, and social support. These types of communication are shown in Table 12.1. Firstly, communication related to the course content is essential for learning. Just as in traditional education, e-learners need to be able to ask questions and share information and ideas. Secondly, support for planning tasks is essential, especially when learners produce some kind of product, such as an assignment, in collaboration with peers. Finally, social support relations are desirable for creating an atmosphere that fosters collaborative learning.

Table 12.1. Three Types of Communication

Type of Exchange	Examples
Content-related	• Ask or answer a content-related question • Share information • Express an idea or thought
Planning of tasks	• Plan work, allocate tasks, coordinate joint efforts, or review drafts • Negotiate and resolve conflicts
Social support	• Express companionship, emotional support, or advice • Use emotions – such as ☺,☹ • Provide support when problems arise – such as when having technical difficulties • Talk about things other than class work

Haythornthwaite has compared asynchronous and synchronous e-learning and focussed on the analysis of

asynchronous and synchronous online seminars held as part of two e-learning classes. The first class included 3 females and 5 males with a mean age of 38 years. The second class included 14 females and 5 males with a mean age of 43 years. Both classes studied knowledge management at the master's level. Potential differences might arise because of the different group sizes, but only a few such differences were evident in the data from this study.

To understand student opinions of asynchronous and synchronous e-learning, Haythornthwaite also conducted 12 half-hour telephone interviews. Four of the interviewees were enrolled in the first class and eight were enrolled in the second class. The interviews, which were recorded and transcribed, were conducted within one month after the seminars concluded.

In the online seminars, questions for the class to discuss and also asked learners to submit questions about the course literature for discussion, were also suggested. The synchronous discussions were conducted by chat and scheduled for three hours. The asynchronous discussions used a discussion board and were scheduled over a week. Two asynchronous and two synchronous discussions from the middle of each course for further analysis were choose. The classes used the same literature and the suggested questions were of similar character, designed to stimulate reflection and sharing of personal experiences relating to the literature in both the asynchronous and synchronous settings. After the online discussions concluded, every written sentence was classified according to the three types of exchanges described in Table 12.1. Some sentences included more than one type of exchange and were counted in more than one category.

The studies reported were conducted in a specific context and with a small sample size. However, the key

arguments are also supported by theory, as will become evident. He did not use learning outcome measures because only two pass/no pass grades were given in the courses, making it difficult to identify statistically significant differences given the small populations. Instead, this relies on measures and perceptions of communication, which have been shown to have a positive effect on perceived learning, grades, and quality assessment of assignments.

The classification of sentences from the seminar discussions is presented in Table 12.2. Almost every sentence in the asynchronous discussions of the smaller group, and a vast majority of sentences in the larger group, were classified as content-related. This is a remarkable result–imagine if learners on campus spent more than 90 percent of their time discussing issues related to course content. These results can also be interpreted as troublesome, however, if e-learners seldom meet face-to-face and teachers mainly rely on asynchronous e-learning, students might feel isolated and not part of learning communities, which is essential for collaboration and learning. When comparing the smaller to the larger class, it seems difficult to get asynchronous discussions going with few participants.

The cognitive model of media choice proposed by Robert and Dennis theorizes that asynchronous communication increases a person's ability to process information. The receiver has more time to comprehend a message because an immediate answer is not expected. In the [asynchronous discussions] it is easier to find some more facts, maybe have a look in a book and do more thorough postings.

In fact, according to Kock's estimate, an exchange of 600 words requires about 6 minutes for complex group tasks in face-to-face settings, while exchanging the same number of words over e-mail would take approximately one hour. This

is the benefit of asynchronomous learning.

When studying Table 12.2, it becomes apparent that synchronous e-learning supports other types of communication more often than does asynchronous e-learning. Almost 60 percent of the sentences related to content, while a third of the sentences related to planning of tasks. This can be explained by the fact that these discussions were limited by time–the participants had to make sure they did what was expected during the scheduled three hours. In synchronous discussions, participants also discussed things other than course work. This was especially evident at the beginning and end of each discussion. No apparent difference could be discerned in the synchronous discussions when comparing the smaller and larger classes.

Kock's media naturalness hypothesis predicts that synchronous communication increases psychological arousal. Similarly, Robert and Dennis's cognitive model of media choice predicts that synchronous communication increases motivation. Kock argues that each element that characterizes "natural" media (for example, the ability to convey and observe facial expressions and body language) contributes to psychological arousal. If these elements are suppressed, however, a decrease in psychological arousal can be expected.

The interviews taken by Haythornthwaite revealed that many e-learners felt that synchronous communication was "more like talking" compared with asynchronous communication. It seemed more acceptable to exchange social support and discuss less "complex" issues. Consequently, the higher sentence counts when communicating synchronously can be explained by the fact that the e-learners felt more psychologically aroused and motivated, since this type of communication more closely resembles face-to-face communication. This finding was

Table 12.2. Sentences Categorized by Type of Communication and E-Learning

Type of Communication	Smaller Class (n=8)		Larger Class (n=19)	
	Synchronous	Asynchronous	Synchronous	Asynchronous
Content-related	876 (58%)	369 (99%)	1,816 (57%)	2,438 (93%)
Planning of tasks	507 (34%)	5 (1%)	935 (29%)	131 (5%)
Social support	198 (13%)	2 (1%)	572 (18%)	124 (2%)
All sentences	1,507(100%)	375 (100%)	3,173(100%)	2,608 (100%)

especially evident in the smaller class.

Thus, synchronous communication enables monitoring the receiver's reaction to a message, which makes the receiver more committed and motivated to read and answer the message. The interviews conducted as part of Haythornthwaite's empirical studies supported this argument:

"Even if I cannot see the person, I write so to speak to the person directly and get an immediate answer."

It can also be expected that the sender becomes more psychologically aroused and motivated because he or she knows a response is likely. In synchronous e-learning, learners respond quickly because they do not want to disrupt the conversation. A downside revealed in the interviews is that the focus is often on quantity rather than quality–that is, trying to write something quickly because "someone else will say what I was going to say."

12.2.2. Cognitive and Personal Dimensions of E-Learning

Synchronous communication makes it possible to monitor the receiver's reaction to a message, making the receiver feel more committed and motivated to read it. When communicating asynchronously, however, the receiver has more time to comprehend the message, since the sender does not expect an immediate answer. Thus, synchronous e-learning increases arousal and motivation, while asynchronous e-learning increases the ability to process information.

The concepts of *personal participation* and *cognitive participation* describe the dimensions of learning supported by asynchronous and synchronous e-learning (Fig. 12.4). Personal participation describes a more arousing type of participation appropriate for less complex information exchanges, including the planning of tasks and social support. Cognitive participation describes a more reflective type of

participation appropriate for discussions of complex issues. It is suggested that, other things being equal, synchronous e-learning better supports personal participation and asynchronous e-learning better supports cognitive participation.

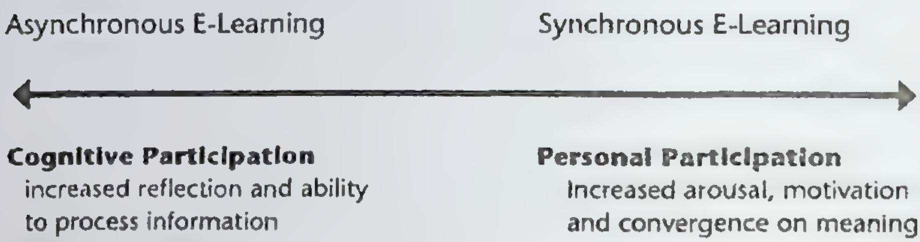


Fig. 12.4. Cognitive and Personal Dimensions of E-Learning

12.3. COMMON BENEFITS OF E-LEARNING

Increasingly, organizations are adopting e-learning as the main delivery method to train employees. At the same time, educational institutions are moving toward the use of the Internet for delivery, both on campus and at a distance. However, in order for organizations and institutions to get involved in this often expensive move, there must be a perception that using e-learning provides major benefits. Some of the benefits for learners and instructors are outlined below.

For learners, e-learning knows no time zones, location and distance are not taken as important. In asynchronous e-learning, students can access the online materials at anytime, while synchronous e-learning allows for real time interaction between students and the instructor. E-learnens can use the Internet to access up-to-date and relevant learning materials as they can communicate with experts in the field in which they are studying. Situated learning is facilitated, since learners can complete online courses, while working on the job or in their own space, and can contextualize the learning.

Table 12.3. Use of Asynchronous versus Synchronous E-Learning

	Asynchronous E-Learning	Synchronous E-Learning
When?	• Reflecting on complex issues • When synchronous meetings cannot be scheduled because of work, family, and other commitments.	• Discussing less complex issues • Getting acquainted • Planning tasks
Why?	• Students have more time to reflect because the sender does not expect an immediate answer.	• Students become more committed and motivated because a quick response is expected.
How?	• Use asynchronous means such as e-mail, discussion boards, and blogs.	• Use synchronous means such as videoconferencing, instant messaging and chat, and complement with face-to-face meetings.
Examples	• Students expected to reflect individually on course topics may be asked to maintain a blog. • Students expected to share reflections regarding course topics and critically assess their peers' ideas may be asked to participate in online discussions on a discussion board.	• Students expected to work in groups may be advised to use instant messaging as support for getting to know each other, exchanging ideas, and planning tasks. • A teacher who wants to present concepts from the literature in a simplified way might give an online lecture by videoconferencing.

For the instructor, tutoring can be done at anytime and from anywhere. Online materials can be updated and learners are able to see the changes at once. When learners are able to access materials on the Internet, it is easier for instructors to direct them to appropriate information based on their needs. If designed properly, online learning systems can be used to determine learners' needs, current level of expertize as well as to assign appropriate materials for learners to select from in order to achieve the desired learning outcomes.

Today, unlike before, educational organizations are surrounded by alternative methods of delivering education to learners. A significant change in learning environments is that the quality of someone's teaching is no longer a personal and/or departmental matter. Faculty behaviour in the classroom is brought out of the dimension of a personal contribution, to a service that is evaluated for its quality, just like other services.

University administrators start trying to assert university ownership over the development of e-learning programs designed to be offered through the Internet. There is great concern on many campuses about faculty members being allowed to teach courses they have designed for online delivery to other universities.

Important trends are characterized by the new requirements imposed on knowledge industry in partnership with educators and librarians to provide adequate changes in education methods and information infrastructures in order to support e-learning as a lifetime activity, i.e. learning anytime and anywhere.

Table 12.3 depicts the situations - when, why and how asynchronous and synchronous learning can be used successfully.

In this competitive era, the role of the traditional library

as the primary provider of information to its community is continuously losing its uniqueness. Local collections and staff are no longer the only source of information services for students and faculty members in their research and teaching endeavors. Users, the students and e-learners, are beginning to perceive the library as something used at the end, or at best in the middle, of their information search. This has important implications for the educational programs as well as for understanding library users' behaviour. Users want control of their own information environment. It is important for them to have some items owned for convenient personal consultation. The user's impression is that the information available free on the Web, is the information that is mostly used. If students do need to ask a person for information, they go to a friend or a colleague as s/he may already have an understanding of that person's context problem or level of understanding.

One of the natural responses to the above challenges consists of introducing the digital library to support e-learning as a learning environment and resources network:

- designed to meet the needs of learners in both individual and collaborative settings,
- constructed to enable dynamic use of a broad array of materials for learning primarily in digital format, and
- managed actively to promote reliably anytime and wherever access to quality collections and services is available both within and without the network.

The other benefits may include the following :

- E-learning can improve understanding and encourage deeper learning, if there is careful course design and choice of technology in relation to learning objectives that aim to encourage deeper learning.

- It can free up face-to-face teacher – student time for discussion, rather than using it to cover information or provide skill practice, depending on the use made of technology.
- It can improve and sustain motivation by offering interesting tasks and material.
- Students need formative feedback throughout the course. This requires careful structuring and the development of channels and projects encouraging student-student interaction as well as strategic use of teacher time to provide feedback. Online tasks, tests, and quizzes are also useful in giving students a picture of their learning progress.
- Student-student interaction can also be enhanced through careful structuring, creating additional support for learning, and even a "learning community". Participation in discussion groups, etc. is supported by linking it to assessment or tasks and measures that "matter".
- It is important that students have a clear picture of the learning objectives for the course, and that assessment methods reflect and support the learning objectives.
- Students need very clear course information, and if accessing the course externally, initial face-to-face sessions are valuable to ensure understanding and skills needed to access the web material, to lay the ground for student-student interaction, particularly if some collaborative work is to be done, and for teacher-student web interaction.
- While asynchronous formats offer students more flexibility, they may also spend more time on a course using the web.

- The technology used has to be reliable, simple, and easily accessed by students.
- E-learning is easier for students who are self-managing, which may mean it is easier for mature students.

However, barriers to making the most of e-learning can arise from students' familiarity with classroom- based methods and assumptions that this is how learning occurs, and from a greater interest in superficial learning to pass a course, than in increasing understanding. But, increasingly attention is focusing on the creation of tasks, material, and feedback mechanisms and channels that will increase motivation and hence encourage self- management, and on course structures, processes, and requirements that provide some additional frameworks for those who need them.

12.4. GROWTH OF E-LEARNING AND ITS IMPLICATIONS FOR LIBRARIES

E-learning has been experiencing a growth spurt over the past five years. Estimates of growth when compared to conventional face-to-face teaching in higher education range from 20-30 percent per year, depending on the jurisdiction measured and the manner in which e-learning is described. The e-learning trend includes courses that are offered fully online, courses that mix face-to-face and online access to instruction and course materials (often called blended learning), and courses in which instructors post notes and materials for students or provide access to online discussion forums on course topics.

Historically, librarians have sought to provide services to distance learners that are equivalent to those available to on-campus learners, and this aspiration is grounded in the philosophical frameworks of the Canadian Library Association's Guidelines for Library Support of Distance and Distributed Learning in Canada and the Association of College

and Research Libraries' Guidelines for Distance Learning Library Services. Both the Canadian and the American Guidelines recognize that distance learners frequently do not have direct access to the full range of library services and materials, and that in this situation, the goal of equity makes it necessary that librarians services that are more "personalized" than might be expected on campus.

Though the role of libraries in e-learning is a relatively new topic in the research literature, however, there has been considerable discussion in academic communities about the efficacy of sharing, reusing, and reengineering selected exemplar learning resources by faculty and instructors in higher education settings. The situation envisioned is a standards-based, interoperable, network-enabled setting in which all members of the academic community can find, use, review, and customize learning resources to suit their instructional needs. To many members of the library community, such a notion would seem to be an extension of the services that libraries have typically provided in academic settings. A key issue for libraries, it would seem, is to continually identify the value-add that libraries and librarians can bring to e-learning that will directly benefit both instructors and learners.

In the examples that follow, librarians are likely aware of the value propositions inherent in each case. What remains at issue is where or how libraries and librarians can play a more dedicated role in supporting instructors or administrators to realize the potential for e-learning through the provision of service models unique to libraries.

A case has been made for the scholarship and professional growth opportunities afforded to academics through the creation and sharing of peer-reviewed learning resources with colleagues in particular disciplines or domains of knowledge. Instructional development and learner

experience advantages have been posited in situations where continuous improvement of learning resources can be realized through the systematic review and revision of the resources.

In other instances, a theoretical case has been presented for the organizational and economic benefits of sharing learning resources across institutional boundaries to avoid duplication of effort in the multitude of courses that share common learning outcomes. As a result of the growing interest in the development of reusable learning resources, research and pilot projects abound that focus on the creation of tools to build and manage distributed databases of learning resources, often called learning object repositories.

In Canada, the largest of these projects was a pan-Canadian initiative called eduSource Canada that involved researchers from public institutions and private corporations who were engaged in building a technical interoperability framework, instructional design tools, metadata tools, and digital rights management tools to facilitate the creation and management of shareable learning resources. In other jurisdictions worldwide, similar projects have been initiated to create networked libraries of digital resources, as well as related tools for the development and delivery of online courseware.

But despite all of the theoretical and technical efforts to rationalize a learning object economy and to build tools that support the operation of such an economy in the higher education context, to date there are very few examples of wide-scale implementation of learning object theory within the practical realities of the higher education domain. Reasons for this may include the lack of specificity surrounding what constitutes a "shareable or reusable" learning resource. More importantly, what is missing generally are the local software tools and licensing processes that will enable faculty and instructors to classify, store, organize, search, and retrieve

exemplar teaching resources from online databases and federated libraries.

Schemes for learning resource use and reuse, and the digital rights management resulting from such an approach range from pay-per-use models implemented by publishing concerns to peer-reviewed libraries with both royalty and non-royalty mechanisms to freely usable collections of online objects created within institutions specifically to enable sharing and reuse scenarios between academics.

However, no commonly accepted format for the sharing and reuse of learning resources has yet to emerge in the academic domain, and certainly none that actively enables widespread implementation of learning-object theory by providing simple, yet effective management processes for sharing learning resources between academics in multiple institutions and in different countries across the Internet.

This is a gap in which libraries and librarians should be able to play a pivotal role. While there have been many experimental projects launched and evaluated during the innovation phase of learning object repository development, there remains a need to consolidate best practices and implement learning resource libraries in a practical and efficient manner. A practical and efficient approach would include highly usable classification and searching tools, as well as digital rights management schemes that honour the rights of intellectual property holders as well as those of faculty and instructors who wish to share resources with peers in a more innovative, Internet-savvy, contemporary manner.

12.5. LIBRARIES AND SHAREABLE ONLINE RESOURCES

Libraries have a long history of providing online literature searches, inter-library loans, and more recently the deployment of multi-institutional, authenticated networks that

allow access to digital journal articles and other electronic resources required by instructors and students to facilitate course work and research assignments. There is both the expertize and the opportunity for academic research libraries to play a guiding role in the consolidation of shareable resource libraries, the provision of digital rights management for instructional resource libraries, and the facilitation of interconnections between federated library systems. These have been the goals of many e-learning research projects, but the services promised by these projects have not yet matured into the practical and ubiquitous kinds of resources and services that academic libraries are known to provide.

The closest model to a functioning digital right management mechanism for the sharing and reuse of digital learning resources or other creative work is the Creative Commons model, a digital copyright and licensing model conceived of by law researchers at the Stanford University Law School.

> *"Creative Commons has developed a Web application that helps people dedicate their creative works to the public domain – or retain their copyright while licensing them as free for certain uses, on certain conditions. Unlike the Open Source GNU GPL license, Creative Commons licenses are not designed for software, but rather for other kinds of creative works: web sites, scholarship, music, film, photography, literature, courseware, etc."*

What makes Creative Commons unique and a potential candidate for the rights management of learning resources that can be used and reused in the academic setting, is its balanced view of copyright and the ownership of intellectual property. Creative Commons draws upon a community of interest approach that has emerged from the Open Source

Software (OSS) community, where the original copyright of a work, usually software code, is held by a developer who makes the software code available for use by other developers along with a license that requires that all improvements and derivations of the code be made available to a community of interest in perpetuity.

OSS community developed its unique approach partially in response to approaches taken by many software companies and entrepreneurs that reserved all rights for developers and corporations and restricted all access to the original software code, sometimes leaving users stranded when a company was dissolved or no longer supported the code. In academic environments where the use of object repositories is being contemplated, a licensing model may be the tipping point in achieving a federated approach to general resource reuse and repurposing.

The philosophy of the Creative Commons copyright and license scheme has been described in the following manner:

> *"Too often the debate over creative control tends to the extremes. At one pole is a vision of total control – a world in which every last use of a work is regulated and in which "all rights reserved" (and then some) is the norm. At the other end is a vision of anarchy – a world in which creators enjoy a wide range of freedom but are left vulnerable to exploitation. Balance, compromise, and moderation – once the driving forces of a copyright system that valued innovation and protection equally – have become endangered species. Creative Commons is working to revive them. We use private rights to create public goods: creative works set free for certain uses."*

The Creative Commons model has been adopted by post-secondary institutions, such as Rice University (Texas)

where the Connexions Project (cnx.rice.edu) has made available thousands of reusable learning resources for use by the university's engineering faculty and students. Each learning resource in the Connexions Library is tagged with a Creative Commons digital deed that allows reuse by faculty and instructors on other campuses worldwide. Creative Commons Canada, based at the University of Ottawa is moving forward with its initiative to introduce copyright and licensing schemes that have the potential to provide more and better creative resources for use and reuse at no or low cost within educational communities.

In British Columbia, the BC campus project has introduced an Online Program Development Fund (OPDF) and has made funds available for course and program development to BC public post-secondary institutions. The OPDF is designed to encourage development of collaborative programs, courses, and services that BC campus can offer online. The intent is to make these program and course materials accessible to everyone in the BC public post-secondary sector. A licensing provision of the Fund requires that the products of development become shareable resources within BC. However, the developers hold intellectual property and copyright in the materials.

With the BC campus OPDF there are two licensing options for developers. In addition to a contractual agreement, a license is also put in place for distribution, sharing, and reuse. Developers may choose either the Creative Commons or BC Commons as the licensing agreement for deliverables created through the Fund. The Creative Commons license provides for sharing and reuse with the world, while the BC Commons license provides for sharing and reuse within BC's public post-secondary system. This is a new approach, and BC campus has received many questions and expressions of interest about it from other provinces that are looking to

institute similar incentive funding within their jurisdictions.

The 2005 BC campus Online Program Development Fund FAQ provides additional detailed explanation of the BC Commons approach. Other groups outside the BC public post-secondary sector have asked for access to the BC Commons license model and agreement language. They see BC Commons as a template they could customize and use for distributing digital assets that they are creating. In response to these requests, versions of the OPDF Agreement and the BC Commons License are available below as portable document files (PDFs). Both documents have been tagged using the Creative Commons Attribution Share-A like license to facilitate use of this licensing model for digital learning resources in Canada and abroad.

Access to licensed or freely available instructional resources and tools continues to be a driver of exemplary online programs. Libraries are in a unique position within their academic domains, having the experience and skills to begin the process of finding, organizing, and licensing resources for use by faculty and instructors on their campuses. Some university departments are already employing "learning object librarians" or copyright-licensing officers whose role it is to identify, obtain, license, and then make available digital resources for use by faculty in both e-learning and blended learning instructional models.

Clearly, these are job roles within the university with potentially broader scope than one faculty or department. Learning object librarian and licensing officer positions appear to be emerging or transformed roles for libraries and librarians that cover two aspects of library work which have existed in differing forms over the years in libraries and are now becoming expanded or transformed in the online context– copyright clearance for course materials and collection building/serials subscriptions. Without an overarching

approach to finding, licensing, and making available shareable resources to faculty and instructors there exists the potential for inequities between faculties and departments. There also exists the potential for duplication of effort and cost, as well as the potentially missed opportunity for collaboration on resource acquisitions between and among institutions. Higher education libraries have often worked in collaboration to support licensing and inter-library resource sharing models.

The key to such an opportunity for leadership would require a proactive policy position on the part of organizations such as CARL and its member libraries. At the current time, funding for special projects in the learning resource repository (LOR) domain of practice that have in the past been funded by federal initiatives such as those of Industry Canada and CANARIE, have recently been suspended. This suspension of funding initiatives comes at a time when new models of licensing such as have been identified and are being adopted in the academic sector. The opportunity exists for CARL and its member libraries to lead in the consolidation of LOR management and licensing practices, and in turn bring an orderly approach to management and use of shared instructional resources by institutions of higher learning across Canada.

12.6. E-LEARNING AND LIBRARIES

Since the end of the nineties, the focus has been on the role of libraries and librarians' skills in the management of digital teaching objects, from metadata to repositories management; the most prominent aspect of this area has been the role of libraries in embedding electronic resources in the Learning Objects. On the other hand, librarians started to use distance learning with broadcasting and TV, and later, e-learning, to teach information literacy and other subjects to library users.

One of the first international meetings devoted to this aspect was "e-Learning for Management and Marketing in Libraries" held in Geneva in 2003. In its keynote speech, Professor John Ellison pointed out the critical aspects for a teacher providing distance learning:

> *"It is strongly recommended that professors gain experience by developing and teaching Distance Learning courses before attempting to develop a complete degree program. Time is such a critical factor when developing Distance Learning courses that the thought of committing to a complete degree program initially without first experiencing the hours and energy required to develop and teach one course is overwhelming. Any professor can conceptualize a complete library and information degree program on paper in a matter of minutes. But it is something else to be able to offer and deliver such a program with any degree of success without first experiencing the time and energy required to teach Distance Learning courses."*

The advancement of the Information communication Technology over the past decade has resulted in profound changes on the availability of knowledge and learning activities. Digital library concepts and applications had already been acknowledged could help learners to access wider choices of information with required good information skills and literacy. Today both learners and instructors need to have the ability to create, structure, locate, search retrieve and use material in multimedia and digital forms. Neuman wrote that:

> *"There are few doubts about the potential of the digital library for providing unprecedented access to information and ideas. There are numerous doubts, however, about the potential of this rich*

and still mysterious venue for providing an optimal environment for learning. In fact the very strength of the digital library - its limitless information, variety formats, affordance of unconstrained navigation and support for combining material in myriad ways."

According to Roes:

"Digital libraries seem, no, are natural complements to digital learning environments. They are able to integrate the freely available information on the web with more formal literature for which increasingly consortium licences on electronic-versions are arranged with publishers. These licences enhance and replace traditional collection development policies... Much work done over the past decade in developing digital libraries will have an important payoff for education innovation. The main issue, of course is whether more active learning styles will become the norm, since many of todays's courses are rather "self contained" nature in which educators present students with text to work through linear way and assessment is too often based on whether or not a student is able to produce the text prescribed by the teacher."

"The e-learning library" refer the most important learning styles and theories, with particular emphasis on behaviourism and constructivism:

"Meanwhile, since maturing Internet technologies are capable of providing an unparalleled technological foundation for designing innovative interactions that are highly engaging, communicative and participative, to formally render models of discourse into cognitive tools supporting effective educational dialogue (...). These approaches are also

addressing the need for the e-learning library to implement theoretically founded interaction models and designs that incorporate learning theories."

Therefore librarians have begun to understand not only the need to manage e-learning platforms and produce learning objects for users self-instruction, but also to explore the basics of pedagogy and teaching skills. A recent and interesting American survey "Trends in E-Learning for Library Staff" show how e-learning is perceived by library staff in US.

Moreover, the involvement in e-learning is one of the highest perceived professional skills in an annual survey conducted on behalf of JISC by the JISC Monitoring Unit at the University of Kent. It *"shows that senior academic librarians believe that managing and promoting e-resources and e-content will be their main challenges over the next few years"*

In the key findings, it is said:

"Head/senior learning and librarian staff from UK institutions feel best informed about e-Learning/VLEs and subjects relating to the library and content management and storage, and least informed about network capabilities, e-Research/e-Science and Green computing/ICT.

The highest awareness of JISC funded activity is in the areas of access management and e-Learning/VLEs. Since 2007, there have been significant increases in the proportions of institutions aware of JISC funding activity in access management, open access and social software/Web 2.0.

12.7. E-LEARNING TECHNOLOGIES IN LIBRARIES

E-learning technologies continue to become more and more available within the academic community with campuses adopting particular brands or styles of online instruction, often at high cost both for purchase and ongoing

support. Increasingly, large numbers of staff are required to service the e-learning infrastructure of a university, commonly through the deployment and support of a Learning Management System (LMS) such as WebCT, Blackboard, Desire2Learn, ANGEL (University of Waterloo), MOSST (Simon Fraser University), or Moodle. Uses of these systems can often be characterized as a "push" type of instructional service, optimized for serving large numbers of students using a digital version of traditional didactic instructional methods.

Libraries on the other hand have tended to work under a different paradigm, providing students with access to online systems that allow them to "pull" information from catalogues, databases, and special collections to suit their learning or research needs. Interestingly, the notion of "pull" is a model of service that is congruent with more progressive higher education teaching and learning models that Laurillard and other researchers have cited as the underpinning of exemplary instructional services. This is an argument for advocating the inclusion of libraries and librarians on the front line of the decision making process when it comes to selecting and implementing a campus based LMS and determining its best usage, where that may not have occurred.

OCLC e-Learning Task Force examined a number of issues related to the integration of library and learning management system functions, and concluded that both students and faculty require complementary tools and services to participate successfully in online teaching and learning environments. The OCLC task force identified system requirements for technical, functional, and cultural aspects of e-learning that needed to be considered when systems are selected and deployed. The OCLC recommendations constitute a general-purpose set of best practice requirements. These are described below :

12.7.1. Technical and Functional Requirements

- Display and integrate a variety of information windows as part of a learning activity.
- Aggregate access – discovery and exchange, to content in any given learning context.
- Provide bibliographic tools that permit easy searching and reference completions.
- Provide access to tools that render and present content in user-customized formats.
- Integrate plagiarism software into course management systems to encourage good practice and to assess reliability of content.

12.7.2. Technical and Cultural Requirements

- Embed library resources in course management systems.
- Integrate third-party commercial information services.
- Customize portal facilities for storing personal preferences.
- Provide easy access to virtual reference services at the point of need, and
- Embed training modules to assist in information seeking.

Some of the recommendations from the OCLC Task Force have undoubtedly found their way into the practices of research libraries at Canadian universities. Librarians are on the front lines of knowledge when it comes to new systems and services that suit the needs of information seekers. However, there remains a requirement for libraries and librarians to be proactive in questioning the selection of learning management systems and complementary e-

learning tools by faculties and departments, and to actively seek representation through appointments to committees that deal with selection, management, and governance of online instructional systems on their campuses.

12.8. COMPONENTS OF E-LEARNING SYSTEMS

E-learning components include – Learning Management System (LMS) or Learning Content Management System (LCMS), content, collaboration, testing and assessment, skills and competency, e-commerce and internet video-based learning. A complete e-learning portal represents the total integration of multimedia, instructor-led, and real-time training–in a human, collaborative environment.

There are many software's are available for e-learning. Here some of the open source and commercial e-learning softares are listed :

Open Source Softwares : ATutor, DoceboLMS, Dokeos, Interact, Moodle, Site@School, WordCircle.

Commercial Softwares : ANGEL Learning LMS and ePortfolio, Blackboard, Desire2Learn, eCollege, eduX VLE systems, Gradepoint, Inquisiq, LearneXact, NetDimensions Enterprise Knowledge Platform, and WebCT.

An example of Virtual Library System of Brunei can be quoted as a good example to show how ICT is being used in library system for e-learning.

VILIS stands for Virtual Library Sytems of Brunei Darussalam. VILIS Brunei is a project to be implemented by the Ministry of Education Brunei Darussalam under the e-government initiative with the aims to facilitate and make available relevant and adequate electronic information resources to all sectors of learning and teaching community in Brunei Darussalam, in an equitable, cooperative and cost effective manner. It facilitates access and enhance the

information resources strength to support research and information needs of the learning and teaching, and the overall objectives of the national education system of Brunei Darussalam.

12.8.1. Component of VILIS

VILIS Brunei comprise of the following conceptual framework:

Resources : Reference resources, databases, electronic journal, knowledge and archival repositories, union catalogue.

Product & Services : Electronic library service, current awareness, document delivery, membership, community information, distance learners service, general information service, online reference service.

E-Business Processes : Online payment and charges for the accessing/acquiring relevant Services, downloading of key Resources, in-house printing, etc.

Technological Implementation : Library automation systems, hardware and software, integration of institutional digitization initiative.

Electronic Publishing and Digitization : Coordinating and publishing of locally published materials.

12.8.2. VILIS and Education

A number of perspectives based on the analysis of the literature are identified in the literature which can be a potential for unifying digital library and with any e-learning programme. Geleijnse identify three areas that library can contribute and make a difference:

- Focus on the integration of the digital library in e-learning
- Engagement in development of institutional

repositories– access, visibility, archiving.

- Contribution to more cooperation and integration in an institution.

While VILIS have identified seven strategies that can and should transform itself in order to cope with changes in our educational systems. These are as follows:

- Linking VILIS with e-Learning environment
- Information Literacy
- Collaborative Course Design
- Physical and virtual Learning Environment
- Integrating services,
- Content Management,
- Information Dissemination.

Linking VILIS with e-Learning Environment : Linking specific courses with digital libraries investigate the technical, institutional and end user challenges. The emphasis will be on institutional and end-user and analysis stakeholders' and learners' needs. Its will look at how teaching staff can be best supported when designing digital learning environments and enriching these environments with resources in digital libraries.

Another approach is by more broadly looking on digital library support for learning environment and concentrate on learning resources in general. This programme seeks to bring together a vast and centralized collection of learning resources supporting all possible kinds of education from primary one to graduate and lifelong learning, into one big library of a nation.

The other strategic approach is linking the course Web site to the library collection and services. Revels advocated

the strategic importance of library presence in university or college- created course Website. There is a rapid expansion of course websites at university and college environment in UK and US. Among the popular course management software is WebCT BlackBoard, CourseInfo that can be integrated with digital library resources. There is a clear trend among these coursewares in the creation of learning spaces as a single point of entry to variety of supporting material. VILIS will make sure that its valuable aggregated resources will be utilized to full extent.

Information Literacy : The challenge faced by learners pursuing knowledge as a result by the introduction of VILIS is not be on how to access some good or enough information, but how effectively to use and manage resources to limit access. Acquiring only the most relevant information or at least a manageable amount of information, to facilitate the process of transforming data and information into mastery of a shared body of knowledge is a continual challenge for learners.

Hence, VILIS is providing electronic information sources services and will have an expanded role in providing educational activities, services, material and opportunities for human interaction. VILIS provides technology and information literacy training as well as training in critical thinking skills, the process of selecting at to create new knowledge and master existing knowledge.

Collaborative Course Design : The most effective learning environment is normally those designed by multidisciplinary team of expert. These may include developing course material, programmers, graphical designers, and expert in assessment. As part of its expertize VILIS will offer its services and information expertise in the designing courses. Digital Librarians from VILIS can add links to the resources, in print or electronic available in their

collection and on the web. They can explain how resources in particular subjects field are organized and show how to trace documents from databases, websites and digitized documents based on the courses to be designed. VILIS works side by side with faculty or subject staff in content creation and presentation and should provide support.

Information Dissemination : Within course environment, course designers are able to take advantage of suite of productivity tools to distribute information to students and engage with students. VILIS makes available resources and services in the course environment for use of faculty or colleges to create and manage their courses. A successful strategy must allow faculty easily to find and integrate resources and services from multiple environment into their unique course.

Physical and Virtual Learning Environment : The integration of libraries with computing facilities as part of learning centres is propagated by VILIS as with many academic libraries, one that will present challenges even more. Increasing the use of the term "learning environment" or learning centre is used for this kind of facility. VILIS has made available a physical learning environment where students and teachers find wealth of resources and facilities, where they can work, on their own or together, in order to learn and teach.

Content Management : VILIS is able to offer integration with institutional or faculty pedagogical repositories of content including its preservation and reusability. It is imperative that VILIS will have to work at persuading faculty and administrator that these services are essentials. VILIS is capable of managing and aggregating content based and positioned it as to be active partners in accessing content, in planning courses and in using course management applications. Thus the following requirements are proposed:

- Consecutively display and integrate a variety of information windows as part of learning activity.
- Aggregate access of discovery and exchange to content in any given learning context.
- Provide bibliographic tools that permit easy searching and reference completions.
- Access to tools that render and present content in user-customised format.
- Integrate plagiarism software into VILIS course management systems to encourage good practice and assess reliability of content.
- Integrate third party commercial information services.
- Customize portal facilities for storing personal preferences.
- Provide easy access to virtual reference services at the point of need, embed training modules to assist in information seeking, and
- In a related front, VILIS as one of the repository centre for content will be able to give support to faculty in terms of managing intellectual property through digital right management.

Integrating Services : VILIS works closely with national or private e-learning initiative and ensure that its technical and service infrastructure level can be converged with any e-learning platform. Hence the following features are proposed:

- Quick, seemless access to systems and information.
- Robust middleware to support authentication and authorization across range of systems and services.
- Better interfaces among systems.

- Flexible tools for specific functions, and
- Stable and comprehensive portal technologies.

It is seemed that VILIS will work towards providing a platform facilitating access managements across institution and across service providers through shared authentication and authorization routines.

12.5. THE ROLE OF DIGITAL LIBRARIES IN E-LEARNING

The introduction of digital libraries into the education process was well prepared by distance education that is being developed over years. With the Internet and the web, distance education programs can mount sets of materials on web servers to support online courses. One of the basic ideas is to join learning materials on various topics, and written by many educators, in a digital library of courseware. Digital libraries have the potential to significantly change fundamental aspects of the classroom in ways that could have an enormous impact on teaching and learning. New pedagogical methods should accompany digital libraries as an emerging technology for education to reach the compelling vision of the education:

"Any individual can participate in on-line education programs regardless of geographic location, age, physical limitation or personal schedule. Everyone can access repositories of educational materials, easily recall past lessons, update skills or select from among different teaching methods in order to discover the most effective style for that individual. Educational programs can be customized to each individual's needs, so that our information revolution reaches everyone and no one gets left behind".

The digital library must not be seen as merely a digitized collection of information objects plus related management tools, rather it must be seen as an environment bringing

together collections, services and people to support the full cycle of creation, dissemination, use and preservation of data, information and knowledge. A number of intermediate goals are formulated for digital libraries and the ways in which they can support e-learning, as follows:

Improve student performance; Get more students excited about science; Increase the quantity, quality and comprehensiveness of Internet-based science educational resources; Make these resources easy to discover and retrieve for students, parents and educators and finally ensure that these resources are available over time.

In e-learning environment, digital libraries are considered as a federation of library services and collections that function together to create a digital learning community. The range of supported materials includes curricula, courseware materials, lectures, lesson plans, computer programs, modelling and simulation, intelligent tutoring systems, access to remote scientific instruments, project-based learning, tools, the results of educational research, scientific research reported both formally in journals and informally in web sites, raw data for student activities and multimedia image banks. Digital libraries should provide services for authors and instructors such as annotation, evaluation and peer review of donated materials. For students and faculty, it will offer the capability to search for desired information by subject area in order to have access to scientific data sets, to interact with peers and to provide archiving, location-independent naming, recommender systems, selective dissemination of information and copyright management. Faculty, students and other clients such as independent learners will be able to participate in forums. Interdisciplinary activities, lifelong learning and the process of education will all benefit. In this way, digital libraries will be much more than the sum of its parts and will promote change and innovation in scientific and technical education.

To aid to achieve the above objectives, the help of various virtual library management systems can be sought that will certainly enrich the access of the contents in Digital Libraries.

12.10. E-LEARNERS, DIGITAL LIBRARIES AND INFORMATION UTILIZATION

With the tremendous growth of the Internet, e-learners have access to an overwhelming range of information sources available at the click of a mouse – library resources, government information, news sites, advertising and many other forms of resources. Librarians have traditionally selected and organized resources with great care. In building digital libraries, librarians have the opportunity to provide e-learners with direction and rescue them from information overload.

A digital library can link e-learners to library catalogues, licensed journal databases, electronic book collections, selected Internet resources, electronic course reserves, tutorials and to forums for communication and interaction with others. The digital library permits e-learners to access library and networked resources as well as services anytime and anywhere that an Internet connection and computing equipment are both available.

Borgman and her colleagues at a working session of a national conference on digital libraries presented a model of the "life cycle" of information which attempted to capture the idea that digital libraries are both repositories of resources and interactive communities. The Information Life Cycle represents three broad phases of information use and life in a social system – creation, searching and utilization. In the contexts of universities and academic libraries, a great deal of emphasis is put on information searching – there is a strong sense in which once the librarian helps to locate specific information, his or her job is finished. This short curve of

interest in information is also evident in digital library research, largely directed toward the needs of specialized professional communities. When such research does point to phases of information utilization and creation, it is often better to consider how specific searching technologies might be made more effective. Additionally, the Information Life Cycle itself implies a particular view of information use that is a characteristic of academic communities - through activities of "retention" and "mining," information leads to the creation of more information, which can be searched and used by others in similar fashion.

What can one say about information creation, searching and utilization in e-learning environment and what are the implications of these terms for the development and use of digital libraries? By and large, searching and locating precise information is often less significant than the entire range of goals prompted once a resource becomes available. What body of resources, could one claim, is necessary for academic digital libraries? While current and diverse resources are helpful and can contribute in significant ways to curriculum, in many cases one resource can be substituted for another to achieve an educational goal. The processes of use are far more significant than is the availability of a fixed data set.

Educators' goals may well include "mining" and "retention" of resources, but they also want students to share, manipulate, analyze critique, oppose and become increasingly curious about the resources they encounter. They may want students to consider not only the resources themselves, but to look behind them and understand the processes of producing them, their intended audiences and their possible meanings. Many educators value students' learning through certain inter-textual connections between resources, but they also want them to develop their own categories, relationships and understandings. Perhaps in the e-learning environment, most importantly, educators want e-learners to develop the kinds of skills and understanding that

would enable them to create resources of the kind they would find in digital libraries. Thus e-learners are potential authors for the library. This is a role, few seriously imagine they can play with respect to traditional libraries.

Even then, the diverse and sometimes contradictory uses of information resources in the e-learning environment become evident. A significant challenge for digital library design and use in the new era will be to support the range of goals that are already alive in the classroom rather than simply modifying information. How can digital libraries and their use open up an e-learner's inquiries rather than bring them to closure? How might they enhance an e-learner's critical thinking, rather than dulling it? How might they assist in teaching e-learner's search processes rather than mystifying or suppressing this instruction? Without asking the real value of using digital libraries or any educational technologies, educators risk failing to see their transformative potentials, and at worst, they risk importing a contrary set of values that are embedded in such systems from their histories in other locations.

For digital libraries, such an implicit value could be summarized as "complete information access leads to better education," just as it may lead to better academic research and work. However, the many educators and librarians who have stacked unused textbooks and shrink-wrapped software packets in the corners of their rooms know that access is only a beginning.

E-learners' use of different technologies, whether traditional materials or digital resources available via the Internet, will help to construct the kinds of values that retain significance in education. As long as the educator and the assignment follow the status quo, any related source of information is a smart choice by e-learners according to their assessment of what to do for assignments. It follows both

the form and content of what an eventual report should look like. Furthermore, e-learners are often pressed for time, either by university scheduling or pro-crastination and will often find the most efficient ways of completing the work, a quality that educators find both admirable and dismaying. The stated and unstated values of an educational context will further intersect with the interests and needs of the e-learners as well as with availability and nature of technological tools she or he is using.

12.11. DIGITAL LIBRARIES AND E-LEARNING LINKAGE; INSTITUTIONAL CONCERNS

It is suggested that effective and efficient linkage of e-learning environments and digital libraries needs to be recognized by senior management in the long term strategic planning of the individual institutional mission, identifying their own specific cultural, social and educational requirements. Kovel-Jarboc concentrates on the potential for the linkage of e-learning environments and digital libraries to produce additional and innovative ways of enhancing teaching and learning experiences. However, as a result of the change in teaching and learning methods, there is a potential likelihood for the blurring and uncertainty over professional roles within an institution. Due to the fact that the integration of digital library resources into the e-learning environment is likely to draw heavily upon the experience of library staff, the changing roles within the information sector are to be explored. Increased responsibilities of library staff may mean they are required to – teach new information retrieval skills; provide content development and input and finally deal with legal matters, maintenance and evaluation of the new learning materials.

Jaffee has commented on the teaching methods and reaction to change, how "in academia, obstacles to change are closely associated with the established practices and

cultural traditions of the teaching faculty." Similarly, Browne has identified how "academics are likely to recognize conceptual shifts within the subject, [while] support staff will be most alert to IT developments."

Sloan identifies an emphasis on the technological and informational building blocks and a neglect of human components, such as the service tradition and human interaction. The continuing changes in technology have been truly astonishing and the scope for building new information services and new ways of representing content seem unlimited. However, it is very important to remember that investment in human capital is also a strategic investment, especially when introducing new technologies, procedures and processes. Although technology is the key infrastructure of the digital library, a tool used to support library goals, human factors are the most important determinants of the success of the digital library.

Digital library serves mainly as a facilitator in organizing and providing knowledge and resources to its users. Sharing knowledge and information among library staff, researchers, faculty, students and other departments within the institution encourages them to work together, develop their skills and form strong and trusting relationships.

A focus on collaboration between the library and the faculty promotes a responsive approach to course design and supports teaching and learning objectives, particularly when this collaboration incorporates student contributions and feedback. All parties must have a common vision in which each one participates actively by contributing their skills and perspectives to the building of a genuine partnership. This new approach considers the library as an active partner of the learning community, helping learners to become "information literates" by integrating information literacy skills into the curriculum. For example, the library can help learners

to evaluate critically the authority and authenticity of the resources they find and to enhance their critical thinking skills. The library can also offer support to learners and can mentor their work by offering one-to-one communication and interaction and by achieving a deeper level of understanding of what learners need.

A number of models can be involved in creating an environment that is responsive to the scholarly information needs of a diverse group of e-learners. Librarians locate, select and describe quality Internet resources and provide access to journal databases and electronic book collections, providing e-learners with full-text content from a wide range of online resources and publications, including peer-reviewed journals. Within this framework, the library works with faculty, researchers, scholarly societies and publishers in developing and managing a collection of enriched online scholarly resources. Such a partnership enables researchers to interact with others, exchange experiences and publish their works online. The library role is thus transformed from simply being a provider of library resources into meeting the ongoing support needs of the parties involved. The library also serves to foster research skills by encouraging students and other learners to search, investigate, discover and take advantage of these valuable online resources.

Management support is also a key to success in developing the digital library as in any other project. The university's or organization's strategic plan should incorporate a distinct section related to library strategies and projects and explains how these strategies are aligned with the overall mission of the university. A digital library should have a high profile leader, a key person who can work to obtain the support of the institution's management and promote a climate of change.

Besides, technological changes have been the

dominant force reshaping library services. Instilling a culture of sharing, motivation, equity and active partnering encourages library staff to respond positively to the changing roles, responsibilities and skills that the integration and use of technology requires. A well-designed, ongoing training program enables library staff to upgrade their skills to their new assignments and helps them to understand and control fear of change.

12.12. E-LEARNERS' EXPECTATIONS FROM LIBRARIANS

It is seen that communication is not just important to break the isolation of students in an e-learning environment but it is also important for a much more basic reason – whatever one person says or writes, the receiver of the information will always interpret the information in the receiver's personal context, created through upbringing, culture, language, etc. This does often lead to deep misunderstandings.

The only way to make sure that information is properly understood is not by reading, hearing or seeing, but by being able to check if things have been understood and by asking questions. This is why an e-learning system that ignores the importance of communication will not work.

The librarians have sought to provide services to distance learners that are equivalent to those available to on-campus learners. Canadian and the American Guidelines recognize that distance learners frequently do not have direct access to the full range of library services and materials and, in this situation, the goal of equity makes it necessary for librarians to provide services that are more "personalized" than what might be expected on campus.

What do e-learners need from librarians? Suggestions advocating change in librarians' roles in support of e-learning

in the information age appear throughout the literature. The librarians "must assert themselves as key players in the learning process thereby changing their roles from information providers to educators". They have become providers of technical support and they have been transformed from "information gatekeepers" to "information gateways". Lippincott advocates librarian involvement in learning communities: "The librarian can shift the focus from explaining library resources to meeting the ongoing information needs of the students in the broad information environment".

In response to the need to provide ongoing digital library support, librarians have worked on translating what they do in a traditional library into virtual or digital environments, while customizing their services and resources for e-learners. Traditionally, libraries offer circulation services, interlibrary loans, course reserves, an information desk, a reference desk and library instruction. To serve learners connected to their institutional library primarily through a computer network, librarians are providing remote access to, and electronic delivery of, library resources, and are using communication technologies to deliver electronic reference services and instructional support.

E-learners are a wider community of learners than "students". Academic library learners may include students, faculty, staff, researchers and so on. The library is seen as a source of training and guidance to a community of learners who are concerned with navigating the complexities of locating and using digital resources and services. Moreover, the move toward a digital environment has resulted in a shift from the systematic one-to-one information flow of the past to a new model in which users and providers of information are able to relate in a many-to-many, dynamic relationship. For example, in traditional model, a librarian functioned as a bridge between learners and information providers by selecting and cataloguing resources and by providing assistance with these

resources. In new model, a library serves as a facilitator by offering ongoing support, enabling learners – to interact and exchange knowledge with others, to communicate directly with the publishers and vendors of information resources and to participate in a collaborative endeavor to make available rich collections of online scholarly information resources.

12.13. E-LEARNERS AND DIGITAL LIBRARY RESOURCES

Technology offers opportunities to be innovative, as the use of electronic resources and services demonstrates, but it is important to bear in mind that not all e-learners are equal when it comes to access to computing equipment; the availability, speed, and stability of Internet connections or the information skills that are needed to make optimum use of digital libraries.

Access to print-based library materials continues to be important; because, not all of the information resources that e-learners need are available in electronic format. Many of our most valuable research materials are still print-based. The Digital Library Federation and the Council on Library and Information Resources commissioned a survey on the use of print and electronic scholarly information resources at institutions of higher education across the United States. The survey found that, although almost half of undergraduates report used electronic resources all or most of the time for their coursework, this was the case for only 35.2 percent of graduate students. Only 34.7 percent of faculty members indicated that they used electronic resources all or most of the time for their research and just 22.7 percent members said they used these in their teaching.

Although there has been a shift away from purchasing print materials, to be housed in a physical building, toward providing access to licensed digital resources made available

over a computer network, librarians continue to work to resolve issues pertaining to distance delivery of resources that are unavailable in digital format. Online catalogues as well as indexing and abstracting systems provide e-learners with convenient access to bibliographic information about valuable scholarly documents. When those documents are not available online in full-text format, a demand is generated for delivery from a library's print collection or from the collections of other libraries through interlibrary loans. Typical solutions for delivery of non-digital formats include the use of mail and courier services, the establishment of collections at designated sites and the negotiation of agreements with other libraries through consortia.

Given that a growing number of learners are accessing library collections online, librarians are working to develop an integrated approach, to provide access to electronic resources, that facilitates retrieval and reduces confusion. A library Web site can function as an information gateway, an entry point to a range of online resources, with key components being the library catalogue and journal databases. Most online catalogues permit the integration of electronic books and electronic journals, enabling learners to locate items from digital and physical collections with one search. User services - i.e., the ability to check due dates, renew materials and request materials online - are also provided. Gateways may also organize collections and incorporate directories.

As libraries work to enhance their presence on the Web, a growing number are investigating the potential of electronic course reserves. The traditional course reserves desk of an academic library, with its limited copies, short loan periods and high late fines, can be a considerable source of frustration for students. In the e-reserves model, the library makes available, through the World Wide Web, items that faculty members have selected and "placed on reserve" for students

in a particular course. San Diego State University (SDSU) pioneered e-reserves in the early 1990s. Many other libraries have initiated their own projects.

Managing the remote access and authentication issues, involved in making digital resources available, has become a significant area of support for users of the digital library. Librarians may be called upon to respond to questions concerning log-in and password information, browser configuration, software installation and a range of troubleshooting needs. Access problems are hugely frustrating for e-learners and must be resolved quickly. If front-line library staff are adequately trained, they can contribute to effective technical support. E-learners also benefit from having a variety of means of contacting the library, including e-mail, Web forms and a toll-free telephone number.

12.14. DIGITAL LIBRARY REFERENCE SERVICES

E-learners require more than access to e-resources. Traditionally, a reference librarian acts as an additional type of resource, one who can be counted upon to provide expertize in making sense of library systems and research tools and to offer a helping hand along that often slippery path known as the research process. Digital library users face additional challenges in mining relevant information out of a computer system that "obstinately" returns zero hits in response to a query that does not match the character strings in its database files.

The most common means of providing electronic reference services to remote users has been the e-mail. The around-the-clock and around-the-world accessibility of e-mail allows users to connect with librarians beyond the walls of library buildings and outside the usual hours of operation. E-mail provides a written record of requests and responses that permits the electronic transmission of search results and

provides librarians with enough time to reflect on requests. One of the most serious concerns about e-mail reference services is their impact on the traditional face-to-face reference interview, particularly the absence of the verbal and non-verbal cues that typically assist a librarian in effectively responding to a question.

There are identified three issues related to the use of electronic communication in serving virtual patrons – immediacy, intricacy and interaction. Because it is so easy for a learner to send a request electronically and have it arrived at the library instantly, there is a perception that the librarian's response will be as immediate. The learner may become frustrated, not realizing that the process of locating information and developing a response takes the librarian just as long when the request is made electronically as when it is made in person or in any other way. The more complex the request, the longer it will take for the librarian to clarify it and respond appropriately – a series of e-mail messages may be required, which will further reduce the immediacy of the e-mail request.

E-mail reference service can be enhanced and supplemented with additional technologies that raise the level of interaction with real-time or live communication. Chat technology allows e-learners and librarians to send text messages back and forth instantly, using a form of communication that is familiar to most Internet users. There have been a number of library experiments with Web contact center software, which is modeled on the private sector's online solution to providing customer support. Web contact center software provides a higher level of interaction than does basic chat software, allowing for queuing and routing of messages, as well as enabling librarians to "push" Web pages to users. Providing e-learners with a toll-free telephone number remains an effective and convenient reference service strategy, particularly for intricate inquiries. The telephone reference interview works best when both librarian

and e-learner are working in front of computers connected to the Internet.

12.15. DIGITAL LIBRARY USER INSTRUCTION

Library instruction has always been a significant role that librarians have played. A survey of academic librarians indicates that librarians' involvement in instruction has increased in recent years as library databases and the Internet have increased the students' need for instruction and information literacy. The reference librarians provide tours, introductory and subject-specific classroom instruction, as well as on-the-fly, at-the-point-of-need instruction in the reference department to address this need.

The new challenge for librarians is to provide similar instruction to a growing population of remote and/or distance e-learners. With the increase in digital library collections that are accessible outside the library via the Internet, students are visiting libraries less frequently. Telephone and e-mail allow reference librarians to provide short and sometimes detailed reference assistance to e-learners, but these media are too cumbersome for remote instruction. However, with the advent of real-time virtual reference, librarians now have the ability to provide instruction to remote and distance learners. E-learners are frequently silent and invisible as they search and explore a digital library's resources, and they do not have the same access that on-campus learners have to formal library instruction sessions. With the array of digital resources available to them, the multiplicity of interfaces and search tools and the need for evaluation and critical thinking when using the Internet for research, "information literacy" skills are a must-have for e-learners. Information literacy refers to competencies with information sources in a variety of formats. According to the Association of College and Research Libraries, an information literate individual is able to :

– Determine the extent of the information needed.
– Access the needed information effectively and efficiently.
– Evaluate information and its sources critically.
– Incorporate selected information into one's knowledge base.
– Use information effectively to accomplish a specific purpose.
– Understand the economic, legal and social issues surrounding the use of information, and access and use information ethically and legally.

Bundy has observed the role that information literacy has to play in participative citizenship, personal empowerment and social inclusion. A recent definition proposed by the 'Prague Declaration' goes yet further by proposing that information literacy constitutes a human right – "Information literacy encompasses knowledge of one's information concerns and needs and the ability to identify, locate, evaluate, organize and effectively create, use and communicate information to address issues or problems at hand; it is a prerequisite for participating effectively in the Information Society and is part of the basic human right of life long learning".

Supporting the integration of information literacy skills training into the core curriculum has become an important issue for libraries. Librarians are designing online tutorials and courses that promote information literacy and encourage active learning as an extension of their traditional role of providing library instruction sessions and developing instructional materials.

Many libraries provide instruction to e-learners by making information available on their Web pages, including

frequently asked questions, library glossaries, research guides and "how-to" pages. Online tutorials usually operate on a model in which the e-learner interacts in isolation with a computer. Their effectiveness can be enhanced by the addition of more interactive forms of instruction. The librarians at the Florida Distance Learning Reference and Referral Center, for example, have experimented with chat software to simulate a virtual classroom and open up "live" group instruction to e-learners. Librarians can also work with faculty members to develop a library thread in a course discussion area, or to open a discussion forum on the library Web pages.

12.16. MOBILE - LEARNING

Mobile-learning or m-learning is the next progressive step from e-iearning or is simply an advanced tool that integrates with e-learning. In either case, m-learning is a new and unique component of distance learning. Zaheer Polsani has defined m-learning as "... .a form of education whose site of production, circulation and consumption is the network", He also revealed that m-Learning has its so many applications in the different spheres of life, i.e., business, industry, education, health etc. Durhand Traxler has defined m-leaming as "...any educational provision where the sole or dominant technologies are handheld." He also quoted that m-Learning is the learning through the use of mobiles where high technology is utilized up to the optimum level from educational point of view.

Further Lewis Sharpies defines m-learning as "...a process of coming to know, by which learners in cooperation with their peers and teachers construct transiently stable interpretations of their world." He emphasized that mutual cooperation of the teachers and the learners come in close affinity by the mobiles and make so many interpretations and solve various dominant problems of the world.

12.16.1. Features of Mobile Learning in Modern Perspectives

Handheld computers and personal digital assistants (PDAs) are more affordable today than before from technological perspective. With respect to pedagogical perspective, m-learning supports a new dimension in the educational sector. Followings are some of the major salient features of m-learning:

- Initiative of knowledge acquisition.
- Mobility of learning setting.
- Interactivity of the learning process.
- Integration of instructional content.
- Immediate and urgent need of learning.

These features of m-learning make it quite different from the traditional classroom learning atmosphere where all educational activities are carried out at a designated time and place and also from e-learning.

12.16.2. E-learning versus Mobile-learning

In the modern age of technology, e-learning is being replaced by m-learning, which is the new innovative tool in learning process in educational institutions. An elaborative definition by Urdan and Weggen provides sufficient basis to distinguish m-learning from e-learning – term e-learning includes a wide range of applications and processes, including web-based learning, virtual classrooms and digital collaboration, etc.

E-learning can be defined as the delivery of content via electronic media including Intranet, Internet, Extranets, audio-video tape, satellite broadcast, interactive TV, and CD-ROM. M-learning on the other hand is a subject of e-learning. It is the macro concept that includes online and mobile learning

environments. In this regard, Alexander Quin explained m-learning as e-learning through mobile computational devices–palms, windows CE machines, even digital cell phone. He aptly remarked that mobile learning is indeed an e-learning because under this learning various electronic gadgets as well as computer software are utilized to enhance learning process.

12.16.3. Parameters for Mobile-learning

The mobile-revolution is finally here in the form of m-learning, which is a natural extension of e-learning. In a span of five years, mobile learning has made an exponential leap from theory explored by academicians to a real contribution to learning. There are four basic parameters for production and development of m-learning. These are:

- Social Interaction: The data can be easily sent to friends, colleagues and others via short messages. You can exchange data with other people and gain considerable knowledge.
- Connectivity: Connectivity plays an extremely important role and is the backbone of m-learning. With the help of this connectivity network, one can connect to data collection devices, other mobile phones, and to a common network.
- Sensitivity to the Context: M-learning has the ability of gathering data unique to the current location, environment and time, which includes both types of data–real and simulated.
- Portable : Since mobile phones can be carried easily everywhere information access through this platform is easy and quite fast.

12.16.4. Four R's of Mobile Learning

Mobile learning in the words of Durhand Sharpies takes into accounts the learner's mobility. M-learning is equally valid when accomplished with a pad of paper and a pen, if that is the appropriate resource for the mobile learner. In comparison to Three R's" of the essential pre-net generation skills (reading, writing and arithmetic), there are "Four R's" of net generation learning which reflect the current socio-cultural shifts in thinking and learning for an increasingly mobile 21st century. These are:

Record: The learner as a gatherer and builder of new knowledge

(i) The learner may use a portable device to capture, preserve, note, memorize or create information.

(ii) The information may be recorded on the portable device itself; or the portable device should serve as a conduit for storing the information remotely.

(iii) Underpinned by a constructivist Theory of Learning.

Reinterpret: The learner as an analyst of existing data to discover new knowledge

(i) The learner may use the portable device to discover, process or enhance existing data so that it is transformed into new information, or "remixed" to enhance learning. In these conditions, the mobile device enhances or supplements the learner's own senses or processing abilities.

(ii) Underpinned by a constructivist Theory of Learning.

The learner as a user of existing information and resources

(i) The learner can use the device to communicate directly and synchronously or access asynchronous

communication services.

(ii) They can also recommend and share resources, e.g., linking mobile devices (usually wirelessly) and sending a file from one to the other.

(iii) It is communicative and collaborative which is underpinned by a social Constructivist or Connectivist Theory of learning.

12.16.5. Benefits of Mobile-learning

Some of the major benefits of m-learning are:

- Mobile phones, PDAs or tablets holding notes and e-books are lighter and can facilitate the whole m-learning process with ease unlike bags full of files, papers and text-books.
- Writing with a stylus pen is more effective than using keyboard and mouse.
- Mobile devices can be used anywhere, any time, including offices, homes or when in transit.
- These devices engage learners through mobile phones, gadgets and games devices such as game Boys. It makes the device invaluable.
- This technology may contribute to combat the digital divide, as mobile devices are generally cheaper than desktop computers.
- The size, shape, weight, and portability of mobile devices have made them extremely effective for users with permanent or temporary disabilities.
- SMS can be used to access information to staff and learners more easily and quickly than phone calls or e-mails.

12.16.6. Disadvantages of Mobile-learning

Despite the paramount importance of many benefits of m-learning in education, there are the following drawbacks also:

- The memory or the storage capacity of m-learning is limited.
- Discharged batteries can result in loss of important data as there is the need to charge regularly.
- It is quite difficult to do job on graphics.
- Lack of common platforms, i.e., horizontal screens with some handheld computers, and small scale screens with mobile phones are difficult to operate.
- The market is fast moving so devices are becoming outdated quite quickly.
- When using wireless networks, bandwidth may degrade with increasing users.

Whatever, the case may be, information and communication technology has given birth to m-learning, which plays a central role in enriching the learning experiences. The learners in various countries who have been disconnected with each other are having connections with any person at any place and at any time. M-learning being the recent technological innovation in classroom situations will help teaching-learning experiences in the productive manner in the future.

12.17. CHALLENGES AND OPPORTUNITIES

E-learners require more than access to e-resources. Traditionally, a reference librarian acts as an additional type of resource, one who can be counted upon to provide expertize in making sense of library systems and research tools, and to offer a helping hand along that often slippery

path known as the research process. Virtual library users face additional challenges in mining relevant information out of a computer system that "obstinately" returns zero hits in response to a query that does not match the character strings in its database files.

The most common means of providing electronic reference services to remote users has been e-mail. E-mail provides a written record of requests and responses, permits the electronic transmission of search results, and allows librarians time to reflect on requests. One of the most serious concerns about e-mail reference services is their impact on the traditional face-to-face reference interview, particularly the absence of the verbal and nonverbal cues that typically assist a librarian in effectively responding to a question. Further, it is so easy for a learner to send a request electronically and have it arrive at the library instantly, there is a perception that the librarian's response will be as immediate. The learner may become frustrated, not realizing that the process of locating information and developing a response takes the librarian just as long when the request is made electronically as when it is made in person or in any other way. The more intricate or complex the request, the longer it will take for the librarian to clarify it and respond appropriately—a series of e-mail messages may be required, which will further reduce the immediacy of the e-mail request. Immediacy and intricacy relate to the lack of interaction—the opportunity to discuss and clarify inquiries that occurs in person or over the telephone is not so easily accommodated by e-mail. But there are ways to deal with some of these issues.

A well designed reference Web form, such as that provided on the Ask AU Library: Ask about a Research Topic Web page, which encourages e-learners to include full identifying and course information, to describe clearly their research problem and search terminology, and to state the

parameters of the assignment, can clarify requests for librarians and reduce the need to e-mail back and forth. Automated replies, which are sent out by the e-mail programme in response to the receipt of a message, can be used to reassure e-learners that their messages are being received, and can let them know what to expect in terms of service.

E-mail reference service can be enhanced and supplemented with additional technologies that raise the level of interaction with realtime or live communication. Chat technology allows e-learners and librarians to send text messages back and forth instantly, using a form of communication that is familiar to most Internet users. There have been a number of library experiments with Web contact center software, which is modeled on the private sector's online solution to providing customer support.

Web contact center software provides a higher level of interaction than does basic chat software, allowing for queuing and routing of messages, as well as enabling librarians to "push" Web pages to users. Providing e-learners with a toll-free telephone number remains an effective and convenient reference services strategy, particularly for intricate inquiries. The telephone reference interview works best when both librarian and e-learners are working in front of computers connected to the Internet.

E-learners are frequently silent and invisible as they search and explore a library's online resources, and they do not have the same access that on-campus learners have to formal library instruction sessions. With the array of digital resources available to them, the multiplicity of interfaces and search tools, and the need for evaluation and critical thinking when using the Internet for research, "information literacy" skills are a must-have for e-learners. Information literacy refers to competencies with information sources in a variety of formats.

As discussed earlier in this chapter, supporting the integration of information literacy skills training into the core curriculum has become an important issue for libraries. As an extension of their traditional role of providing library instruction sessions and developing instructional materials, librarians are designing online tutorials and courses that promote information literacy and encourage active learning. Particularly fine examples are the University of Texas System Digital Library's TILT-Texas Information Literacy Tutorial and Utah Academic Library Consortium's Internet Navigator, a multi-institutional online course developed by a team of librarians and Web developers.

The British Open University Library has developed SAFARI, a freely available interactive tutorial, as well as an information literacy course called MOSAIC, the Making Sense of Information in the Connected Age. Many libraries provide instruction to e-learners by making information available on their Web pages, including frequently asked questions, library glossaries, research guides, and "how-to" pages. Athabasca University Library's Digital Reference Centre integrates resources with contextual instruction and provides links to instructional resources, including a detailed guide to Internet searching that encourages e-learners to think critically about Internet resources, and library research guides.

Online tutorials usually operate on a model in which the e-learner interacts in isolation with a computer. Their effectiveness can be enhanced by the addition of more interactive forms of instruction. The librarians at the Florida Distance Learning Reference and Referral Center, for example, have experimented with chat software to simulate a virtual classroom and open up "live" group instruction to e-learners. Librarians can also work with faculty to develop a library thread in a course discussion area, or to open a discussion forum on the library Web pages.

Sloan identifies an emphasis on the technological and informational building blocks, and a neglect of human components, such as the service tradition and human interaction. The continuing changes in technology have been truly astonishing, and the scope for building new information services and new ways of representing content seem unlimited. Further, the digital library serves mainly as a facilitator in organizing and providing knowledge and resources to its users. Sharing knowledge and information among library staff, researchers, faculty, students, and other departments within the institution encourages them to work together, develop their skills, and form strong and trusting relationships.

But all parties must have a common vision in which each one participates actively by contributing their skills and perspectives to the building of a genuine partnership. This new approach considers the library as an active partner of the learning community, helping learners to become "information literates" by integrating information literacy skills into the curriculum. For example, the library can help learners to evaluate critically the authority and authenticity of the resources they find, and to enhance their critical thinking skills. The library can also offer support to learners, and can mentor their work by offering one-to-one communication and interaction, and by achieving a deeper level of understanding of what learners need.

Librarians can locate, select and describe quality Internet resources, and provide access to journal databases and electronic book collections, providing e-learners with full-text content from a wide range of online resources and publications, including peer-reviewed journals. Within this framework, the library works with faculty, researchers, scholarly societies, and publishers in developing and managing a collection of enriched online scholarly resources,

Such a partnership enables researchers to interact with others, exchange experiences, and publish their works online. The library role is thus transformed from simply being a provider of library resources, into meeting the ongoing support needs of the parties involved. The library also serves to foster research skills by encouraging students and other learners to search, investigate, discover, and take advantage of these valuable online resources.

Additionally, the virtual library or a digital library should have a high profile leader, a key person who can work to obtain the support of the institution's management and promote a climate of change. The leader must work with different groups within the institution to ensure that the project responds to their specific needs and goals. For example, when Athabasca University Library initiated the Digital Reading Room project as an enhanced electronic course reserves system, the Library entered into partnership with the Educational Media Development unit to ensure a best practices approach to Web- and visual-design aspects.

Consultation with faculty has been an ongoing element of the project, with faculty selecting content and acting as consultants in evaluating the design and functionality of the Digital Reading Room in relation to their course development and delivery needs. All staff involved in providing library support to e-learners must be included in the partnership. Technological changes have been the dominant force reshaping library services. Instilling a culture of sharing, motivation, equity, and active partnering encourages library staff to respond positively to the changing roles, responsibilities, and skills that the integration and use of technology requires.

A well-designed, ongoing training programme enables library staff to upgrade their skills to their new assignments, and helps them to understand and control fear of change.

External partnerships, collaborative efforts, and consortia form another important bridge to the effective support of e-learners. Within Canada, university libraries extend in-person borrowing privileges to students, faculty, and staff from across the country through the Canadian University Reciprocal Borrowing Agreement. There are also initiatives to share virtual reference desks, such as the National Library of Canada's Virtual Reference Canada, which allow learners to benefit from the range of information resources and staff expertize available at a variety of participating institutions.

Consortial approaches to database subscriptions enable libraries to expand the scope of the electronic resources they are able to offer their learners in a time of shrinking budgets and escalating journal costs. The Canadian National Site Licensing Project negotiates licensing agreements that permit participating universities across Canada to access a suite of research databases in the science, engineering, health and environmental disciplines. INDEST (Indian Digital Library of Engineering Science and Technology) and UGC-INFONET are also providing consortial-based e-resources to Indian libraries.

12.18. E-LEARNING IN INDIA

E-learning practices have been initiated with traditional learning for about the past two decades. But in late 90's regarding the Indian scenario the proportion is very low though there are so many positive aspects such as the information available at "anywhere", "anytime", "any form" and "any format" round the clock. But the recent studies have prove that users felt comfort with internet based learning due to the flexibility, cost saving, the global interaction, and multimedia tutors, etc. The access mechanism, standards for retrieving the data, transporting the data etc., are attracting the user to go for the e-learning.

12.18.1. How to Make the E-learning a Success Process in India?

The e-learning process can be processed in a very useful and satisfactory way by having the following tips in mind:

- The teacher should be more enthusiastic and skilled;
- We should have direct approach with the director and goal setter;
- User guide should be provided for better use of the system;
- The access mechanism should be made very simple;
- Search strategies should be explained in the literacy programme;
- Be more institutional members of various academic institutions for sharing the resources;
- Subscribe more number of e-books and e-journals; and
- Follow easy strategy for the content development and indexing.

It is seen, the increasing comforts of IT and the efficiency of the institutional goals made 'knowledge' as a commodity. Though IPR issues and other constrains have fuelled considerable irritation among the students, ultimately, e-learning has become a component of performance enhancement and convergence of e-learning business. Besides, the online learning in the knowledge society is achieved.

While we talk about e-learning as a commodity, the quality of information we delivered and the common formats adopted in the standards (ex. Metadata) are having its own effect on the e-learner's quality of education. This leads to a set of tools for organizing content at higher level granularity.

Secondly the educational packages, the training packages, e-books, e-journals and the Bibliographic data bases have been marketed to the e-learners which ultimately made us think that the knowledge production have been treated as a commodity.

12.18.2. E-learning and the Government

The Indian Government has made so many policies to eradicate the illiteracy by making education more liberal and self-reliance. The Ministry of Science and Technology has brought policies which includes e-learning as a basic tool of acceleration, they are:

- Preparing a base blueprint of IT plan with phase-wise implementation.
- Design, integration and implementation of an informative website of the Ministry/Department;
- Application of software development for internal processing and also for interactive public information system through internet and stand alone basis; and
- Formal customized training to all categories of officers and staff in DST.

The literacy rate in urban India is 80 per cent and the rural is 56 per cent. E- learning is an emerging area in India which can make the student and the environment to enhance teaching and learning effectively, which may ultimately wipe away the illiteracy.

Some initiatives launched by the government and private concerns in starting has been listed out here:

- To promote IT industries :
  - GOI–Committee for "IT for the masses".
  - GOI–Digital Villages are to setup.

- *GOI and Massachusetts Institute of Technology* : To establish Media lab in India.
- *Sikkim Manipal University*: E-learning centre at Karnataka.
- *NIIT India*: Net versity for e-learning.
- *Aptech*: Online university.
- *E-Gurukul.com University/E-learning centre.*
- *Educomp Datamatics-Ltd.*: "Planet Vidya Intranet Solution".
- *Pentasoft technologies*: Collaborated with Sollyhull University, UK, Kazak American University etc.
- *McMillan India*: "Good Design Series".

But with the advancement in ICT, majority of the universities have become the centres of E-learning, especially in the first decade of 21st century. Besides, knowledge commission has also framed a broad spectrum for e-learning to be followed.

Finally saying, as Internet continue to grow and become a major publishing medium, learning will emphasize more on Internet based library, and physical presence will be a thing of the past. Time will not be a factor and learners will become more sophisticated. The World Wide Web will continue to provide an unparallel connectivity among diverse people, and access to digital library will increasingly extend to people in their homes, vehicles, information centres, malls, offices and educational institution. Libraries and librarians will be more relevant and information literacy will be the core competency requirements for the survival in floods of information. However, the strength of digital libraries and digital collections depends on the relationships libraries develop and maintain with the creators, publishers and aggregators of e-resources

as well as with those who use, learn from and evaluate these resources. Providing ongoing technical, reference and instructional support to e-learners requires that libraries redefine their values and services, collaborate with their users and approach their tasks creatively.

13
Open Source Software for Creating Digital Library

The implementation of Open Source Software or OSS in libraries represents a method for improving library services and collections. A variety of interpretations exist with regard to the nature of OSS, sometimes confusing it with different kinds of gratis software or liberally using the term for either the development process, the software product or a particular licensing scheme. Free and OSS is also often mentioned in the same breath as open standards or interoperability, which are distinct issues in their own right.

OSS is built and enhanced through public collaboration. It is free in that it gives the user unrestricted access to the source code. The source code shows how the software works in a language that programmers can understand. But in order to use OSS, users must agree to a license, which usually includes the ability to run the program, have the source code, change the source code, and distribute it. Collaboration is also how problems with the software are detected. Glitches are more easily detected when many people look at and use the software. However, some licenses restrict users from putting OSS into proprietary licensed software.

The most important aspect of the OSS is the participation of users. When the users want a feature added or bug fixed for a program, they have traditionally been at the mercy of the software vendor. However, with open source they can modify the program to their own needs or fix what is broken.

13.1. WHAT IS OPEN SOURCE SOFTWARE

The concept of Open source began with the "Open Source Software" or "free software" which was founded in 1998 by John M. Hall, Larry Augustin, Eric S. Raymond, Bruce Perens, and others. Since then the Open Source Software (OSS) movement has become a revolution in software development. OSS is software that is licensed to guarantee free access to the programming behind the precompiled binary, otherwise called the source code. This allows the user to install the software on a new platform without an additional purchase and to get support for a product whose creator no longer supports it.

Historically, there have been many ways to release software free of cost under such auspicious software licenses as freeware, shareware, and the public domain, As such it can be confusing for the public to discern the subtle differences, particularly in comparison to the open source model. *Freeware* is the software that is released free of cost in binary format only, usually prohibiting modifications and commercial redistribution on the part of the end user. *Shareware* is the software that is released free of cost in binary format only, usually on a trial basis regarding time usage or functionality to encourage purchase. *Public domain* is the software whose copyrights has expired or has been released from copyright obligations by the author(s), rendering it free of restrictions on usage and redistribution. Although often "abandoned" with its source code intact, its feasibility quickly

dissolves without someone willing to continue maintaining the source code in light of technological evolution.

The open source model is a collaborative programming infrastructure that co-opts copyright law by freely releasing source code to the general public for any use, modification, and redistribution without licensing restrictions. The source code refers to instructions written by humans in a computer programming language to be compiled into a binary format that can be run on a computer, carrying out the tasks outlined in the source code. The collaborative element means that participation in such projects through the wide availability of the source code is open to a diverse talent pool of volunteers, namely anyone and everyone.

OSS means any computer software whose source code is either in the public domain or, more commonly, is copyrighted by one or more persons/entities and distributed under an open source license such as the GNU General Public License. Such a license may require that the source code be distributed along with the software, and that the source code be freely modifiable, with at most minor restrictions, such as a requirement to preserve the authors' names and copyright statement in the code. The licenses under which OSS is released vary greatly, but these two points remain consistent. This is vastly different from the mainstream software industry where source code is highly guarded and programs are only distributed in their binary, un-modifiable format.

OSS is typically created and maintained by developers crossing institutional and national boundaries, collaborating by using internet-based communications and development tools. The products are typically a certain kind of "free", often through a license that specifies that applications and source code – the programming instructions written to create the applications, are free to use, modify, and redistribute as long

as all uses, modifications, and redistributions are similarly licensed as per General Public Licence, Berkeley Software Distribution and Mozilla Public License etc.

13.1.1. Features of OSS

The main features of OSS, and the mechanisms that drive the working of open source projects which enable these features are:

- One of the main attractive features of OSS is that its source code is available.
- It is possible to customize a particular software application according to local needs.
- Have the software at their disposal to fit it to their needs. Of course, this includes improving it, fixing its bugs, augmenting its functionality, and studying its operation.
- Redistribute the software to other users, who could themselves use it according to their own needs. This redistribution can be done for free, or at a charge, not fixed beforehand.

13.1.2. OSS Licenses

With the current legal framework, the license under which a program is distributed defines exactly the rights which its users have over it. For instance, in most proprietary programs the licence withdraws the rights of copying, modification, lending, renting, use in several machines, etc. In fact, licences usually specify that the proprietor of the program is the company which publishes it, which just sells restricted rights to use it.

Authors can choose to protect their software with different licensees according to the degree with which they want to fulfill these goals, and the details which they want to ensure. In fact, authors can distribute their software with

different licences through different channels. Therefore, the author of a program usually chooses very carefully the licence under which it will be distributed. And users, especially those who redistribute or modify the software, have to carefully study its licence. Under the OSS, licenses must meet ten conditions in order to be considered open source licenses:

1. *Free Redistribution*: the software can be freely given away or sold.
2. *Source Code*: the source code must either be included or freely obtainable.
3. *Derived Works*: redistribution of modifications must be allowed.
4. *Integrity of the Author's Source Code*: licenses may require that modifications are redistributed only as patches.
5. *No Discrimination against Persons or Groups*: no-one can be locked out.
6. *No Discrimination against Fields of Endeavour*: commercial users cannot be excluded,
7. *Distribution of License*: rights must apply to everyone who receives the program.
8. *License must not be Specific to a Product*: the program cannot be licensed only as part of a larger distribution.
9. *License must not restrict Other Software*: the license cannot insist that any other software, it is distributed with, must also be open source.
10. *License must be Technology-Neutral*: no click-wrap licenses or other medium-specific ways of accepting the license must be required.

There are a few common open source licenses, which provide certain privileges to users and impose restrictions on

the use of the Open Source Software. These are explained as under:

GNU General Public License : Richard Stallman of the Massachusetts Institute of Technology and the Free Software Foundation developed the GNU General Public License in 1985. The GPL is based on the concept that essential components of free software include the right to distribute, the right to get source code, and the right to modify. The GPL provides that derivative works created under a GPL license remain free and must be released under the terms of the GPL. This concept, generally known as copy left, provides that anyone who redistributes such software, whether with or without changes, must also pass along the rights to further copy and modify the software.

This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work and a "Work based on the Program" means either the Program or any derivative work under copyright law – that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/ or translated into another language.

The preamble to the GNU General Public License (GPL) makes much of the fact that "licenses for most software are designed to take away your freedom" whereas the GPL "is intended to guarantee your freedom to share and change free software". It is true that a licensor under the GPL does gives up many of its exclusive rights to control the copying and modification of the software, in that it allows the licensee:

- To distribute verbatim copies;
- To modify copies or parts of them; and
- To copy and distribute modified copies of the program.

However, the GPL also imposes certain significant limits on the rights of copying and distribution of the software that it grants, namely:

- a copy of the license must be distributed with the software;
- interactive programs must display a notice that describes the licensing terms;
- a copy of the source code must be included or otherwise made available to the licensee; and
- distribution of the software is not permitted except on the terms that the GPL provides.

The GPL also regulates modification which are also known as the creation of "derivative works" of the software; that is another exclusive right of the copyright owner in which:

- any modifications must be documented; and
- derivative works must be licensed under the GPL.

The GPL mandates that enhancements, derivatives, and even code that incorporate licensed code are also themselves released as source code under the GPL. This "vital" behaviour has been trumpeted widely by open-source advocates as a way to ensure that code that begins free, remains free–that there is no chance of a commercial interest forking their own development version from the available code and committing resources that are not made public. In the eyes of those who put a GPL on their software, they would much rather has no contribution than have a contribution they could not use as freely as the original. The GPL is an extraordinarily effective means to establish a platform that discourages competitive platforms from being created, and which protects your claim to fame as the "premier" provider of products and services that sit upon this platform.

GNU Lesser General Public License : The Lesser

(formerly Library) General Public License (LGPL) can be distinguished from the GPL in two relevant respects. Firstly, it specifies that it is only to be used for software libraries, although in fact it is commonly used for other software also. Second, it allows the software to be linked with proprietary code, which the GPL does not. Essentially, the LGPL can be regarded as a non-vital form of the GPL that is intended for software libraries only. These two distinctions from the GPL do not have any impact upon the enforceability of the license. That is not to say that there are not some traps in using the LGPL; the distinction between a derivative work which has to be distributed under the LGPL.

The BSD License : BSD licenses represent a family of a permissive free software licenses. The original was used for the Berkeley Software Distribution, a Unix-like operating system for which the license is named. The original owners of BSD were the Regents of the University of California because BSD was first written at the University of California, Berkeley. The first version of the license was revised, and the resulting licenses are more properly called modified "BSD licenses. Permissive licenses, sometimes with important differences pertaining to license compatibility, are referred to as "BSD-style licenses".

This is the copyright used by Apache and by the BSD-based operating systems projects (FreeBSD, OpenBSD, NetBSD), and by and large it can be summed up as, "Here's this code, do what you like with it, we do not care, just give us credit if you try and sell it". The BSD license is the shortest and simplest of the common licenses, at only 225 words compared to the GPL's 2968 and the LGPL's 4380. Its simplicity makes it the more likely to be enforceable as a whole than either of those other licenses. It allows the software to be used and modified freely, subject only to the retention of attribution of the work of previous contributors.

From a business perspective, this is the best type of license for jumping into an existing project, as there are no worries about licenses or restrictions on future use or redistribution. This may be mixed and can be matched with own proprietary code. This is one reason why this is chosen for the Apache group–unlike many free software projects, Apache was started largely by commercial webmasters in search of a better web server for their own commercial needs. While probably none of the original team had a goal of creating a commercial server on top of Apache.

The main effective difference between the BSD license and the GPL is that derivative works are not required to be licensed freely, but can be re-licensed under a proprietary license. Unlike the LGPL, this does not just apply to programs that are linked with the original code. The original BSD license also contained a clause which required the code to contain an acknowledgment sentence in any advertising materials, whereas the revised BSD license that was released in 1999 excluded the same.

The degree of openness has risks. No incentive is built into the license to encourage companies to contribute their code enhancements back to the project. There are many cases in Apache's history, where companies have developed technology around it that any one would have like to have seen offered back to the project.

The Mozilla Public License : The Mozilla Public License (MPL) was developed by the Netscape Mozilla team for use on their project. It was the first new license in several years when it was released, and really addressed some key issues not addressed by the BSD or GNU licenses. It is adjacent to the BSD-style license in the spectrum of open-source software licenses. It is different with other licenses in two ways – it mandates that changes to the "distribution" also be released under the same copyright as the MPL, which thus makes it

available back to the project; and its "distribution" is defined as the files as distributed in the source code. This is important, because it allows a company to add an interface to a proprietary library of code without mandating that the other library of code also be made MPL–only the interface. Thus, this software can more or less be combined into a commercial software environment.

The Mozilla Public License (MPL) is a much more comprehensive contractual-style license document, which like the GPL requires derivative works to be freely licensed, although not necessarily under the MPL. The MPL contains some very good clauses dealing with the possible existence of third party intellectual property claims or patent rights over contributed code and clauses detailing how the contributions of developers are to be documented. There is also a clause which states that if your license to use the software is terminated because you have breached its terms, that does not affect any sub-licenses that you may have granted to other people.

It has several provisions protecting both the project as a whole and its developers against patent issues in contributed code. It mandates that the company or individual contributing code back to the project release any and all claims to patent rights that may be exposed by the code.

In case of Mozilla Public License, there is always the risk that a company could innocently offer code to a project, and then once that code has been implemented thoroughly, then the creator of OSS may demand some sort of patent fee for its use. So, this second provision prevents the case of anyone surreptitiously providing code they know is patented and liable to cause problems for everyone those who applied the Open Source Software.

The Artistic License : Software licensed under the Artistic License may be freely distributed and modified,

provided that any modifications are documented and in some cases made freely available. Like the MPL but unlike the GPL, the Artistic License does not require derivative works to be licensed under the same terms as the original. The Artistic License in its most widely-used version suffers from loose wording. It also included Perl Version-6 under its Version-2.0. So having reviewed a selection of the best-known open source software licences, it appears to be good in practice.

13.1.3. Advantages of OSS

OSS offers a different and exponentially better software development model. Companies can also improve their products, and increase their market. So open source is good for every one.

Access to Source Code : The availability of the source code and right to modify enables the unlimited tuning and improvement of software products.

Right to Redistribute Modification : Its right to redistribute modifications and improvements permits all the advantages due to modifiability of the software to be shared by large communications.

The Right to use the Software in Any Way: This, combined with redistribution rights, ensures a large population of users, which helps in turn to build up a market for support and customization of the software, which can only attract more and more developers to work in the project.

Cost Effective: Usually, the perceived advantage of open source models is the fact that OSS is made available gratis or at a low cost.

Customizable: Since OSS comes with the source, one can customize existing software to suit own's needs. Open source license's typically guarantee the right to be able to customize the software.

Preventing Re-invention of the Wheel: Since we can reuse existing code, effort is not wasted in re-developing software that already exists. Open source development can build on the entire body of work already released under a suitable open source license.

Helping the Progress of Technology: Efforts can be concentrated in making existing software better. This helps the progress of technology.

More Secure: Since the source code is open, more people scrutinize the source code and hence more flaws are found and corrected.

Technology Transfer at Zero Cost: Since the source code is open, anyone can learn how the software was developed, thus facilitating technology transfer at zero cost.

Allows for Easier Localization: To translate a particular software package into another language using proprietary software is possible.

Prevent Misuse of Monopoly Positions: The availability of the source code dictates that software vendors will always have to follow market demands and will not be able to misuse monopoly positions.

Development Advantages: With many open source projects, a virtual community of developers grows around the software. The company then incurs lower overhead because of unpaid, outsourced work that is closer to customers who use the product.

More Programmers are Better: One would think that by having more programmers, a piece of software could be created faster and better.

13.1.4. Disadvantages of OSS

There are several disadvantages, some of which are

aspects of higher life cycle costs. Because of the disadvantages listed below, open source products for the most part have become popular as black box, server-side appliances, not as interactive applications. The main disadvantages are:

Perceived Disadvantages of Open Source Models: Of course, open source development models lead also to the perception of some disadvantages. However, some of them are only disadvantages if we stick to classical or proprietary development models, which is of course not the case with open source.

Limited or No Accountability: There is limited domain of solutions, and limited hard real-time support.

Patented Proprietary File Formats: Some file formats have been patented, or for other reasons, cannot be read by Open Source products. Software patents are often given out loosely.

Resistance to Migration: Most of the world's offices and desktops are currently using proprietary software. The migration to open source costs money and takes efforts in the short term, before long term benefits can be obtained.

Total Cost of Ownership Argument: For a long time, it was argued that although OSS was initially cheaper, the long term 'total cost of ownership' was higher. Increasingly, OSS is winning this argument.

Lack of Advertising: There are only a few major proprietary software companies, and they have made a lot of money, which they can then spend on advertising.

Fear, Uncertainty and Doubt: The majority of the commercial software industry finds it easier to criticise or scare people away from OSS, than embrace it, and change their business models.

Proprietary Software offering Open Source Code: The proprietary software sometimes tries to blur the line between proprietary and free or open software. This is an attempt to show that proprietary software has the same openness as OSS.

Lack of an Ecosystem : A problem often cited is the lack of an open source 'ecosystem', comprising lots of companies both large and small, and willing to offer support etc. Major organizations need this before they are willing to use any product.

Piracy: The piracy is common in the proprietary software world, since the legally purchased software is so expensive. Piracy makes proprietary software seem cheaper than it really is. It is sometimes alleged that proprietary software vendors 'look the other way' in developing countries when they know piracy is happening, until the country is heavily locked into the proprietary software.

Restricted Choice: In virtually every area of software there are dozens if not hundreds or even thousands of choices for different commercial packages, but rarely are there more than one or two, if any, open source options.

Poor Integration: Open source products tend to be created by people, so as a result their products are poorly integrated.

Poor Interactive Capabilities: OSS with an interactive user interface is good as "average good" interactive packages in Windows.

Difficult to Use: OSS tend to be written by engineers for other engineers and for many of them it is accepted that ordinary function will involve creation of configuration files, writing scripts, or actually editing the source code and recompiling. This make OSS difficult to use.

Higher Cost of Installation : Commercial vendors are forced by intense competition to configure their products for easy installation. Open source tends to have much higher installation costs because a much greater degree of expertize usually is required for installation.

Higher Cost of Operation: Open source products tend to require a much higher degree of technical expertize to operate and maintain, so they end up costing more.

Higher Cost of Technical Support: Open source costs more to support because the software is typically self-supporting.

Lack of Capabilities/Features: Open software packages tend to have far fewer features and capabilities than commercial equivalents.

Poor Customer Response: A well-run commercial software company will immediately turn around customer requests for enhancements. With open source, if you do not do it yourself you are at the mercy of a disjoint community of developers.

Lack of Innovation/Codification of Obsolete Architectures: The glacially slow pace of development within open source movements and the design by committee, consensus process tends to assure that obsolete architectures get implemented within open source.

No Warranty: There is no single company backing the product.

13.2. OSS AND LIBRARIES

Open Source Systems for Libraries (OSS4Lib), states that open source systems could improve library services in many ways. First, when they are licensed in the typical "general license" manner, cost nothing (or next to nothing) to

use-whether they have one or one thousand users. Rather than spending thousands on systems, such funds might be reallocated for training, hiring, or support needs, areas where libraries tend toward chronic shortfalls.

Second, open source product support is not locked in to a single vendor. The community of developers for a particular open source product tends to be a powerful support structure for Linux and other products because of the pride in ownership. Also, anyone can go into business to provide support for software for which the very source code is freely available. Thus even if a library buys an open source system from one vendor, it might choose down the road to buy technical support from another company–or to arrange for technical support from a third-party at the time of purchase. On top of this flexibility, any library with technical staff capable of understanding source code might find that its own staff might provide better internal support because the staff could have a better understanding of how the systems work.

Third, the entire library community might share the responsibility of solving information systems accessibility issues. Few systems vendors make a profit by focusing their products on serving the needs of users who cannot operate in the windows/icons/menus/pointer world. If developers building systems for the vision impaired and other user groups requiring alternative access environments were to cooperate on creating a shared base of user interfaces, these shared solutions might be freely built into systems around the world far more rapidly and successfully than ever before.

The principles of OSS are very similar to the principles of librarianship. As you may see, there are many shared principles between OSS and librarianship, especially the free and equal access to information. Anybody who works with computers on a daily basis can contribute to OSS because things like information architecture, usability testing,

documentation, and staffing are key skills required for successful projects, and these skills are inherent in the people who use computers as a primary tool in their work. The implementation of OSS in libraries represents a method for improving library services and collections. Let's take advantage of these principles and use them to take more control of over our computing environments. Altman states for the library fraternity there are other set of reasons too for preferring OSS over commercial software. Long term preservation, assurance of privacy, provision for auditing, facilitating community resources, and conformity to open standards are hallmarks of OSS. Since commercial software is usually distributed only as a binary that will run only on a single hardware platform, commercial software is very difficult to preserve over the long run without developing hardware emulation. OSS, in contrast, can often be recompiled, or at least ported, to new hardware and operating systems. In order to get a picture about the availability of OSS for digital library applications, it is encouraged to visit the directories of OSS projects, such as GNU (http://www.gnu.org/) and Sourceforge (http://www.sourceforge.net/) open source directory which lists over 230,000 projects with more than 2 million registered users, and the numbers continue to grow.

13.3. DIGITAL LIBRARY SOFTWARE

Undoubtedly it is essential to have a robust and flexible digital collections management and presentation software for creating and delivering digital collections. The preservation of digital objects is currently intimately tied to software that presents those objects. Complete preservation of complex digital objects, especially, is likely to require preservation of the software needed to use those objects. The complexity of the situation is that digital library technologies and contents are not static. Continual evolution and investment are required to maintain the digital library. Commercial digital library

products are comprehensive and extensible enough to support this evolution, but in many cases they are beyond the reach of most of the libraries in India. Some of the popular commercial DL software in the Indian libraries are VTLS (http://www.vtls.com) from the international market and ACADO (http://www.transversalnet.com/acado/index.htm) as an Indian initiative. The latter is definitely less costlier when compared but still striving its best to get a critical mass of users. The whole lot of associated issues include initial purchase fee, licensing fee, upgrade fee, annual maintenance contacts (AMCs) and so on. The best available choice for the librarian now is to turn to an Open Source Software (OSS). OSS has grown tremendously in scope and popularity over the last several years, and is now in widespread use. The growth of OSS has gained the attention of research librarians and created new opportunities for libraries. OSS is close to our hearts primarily for their free (or almost free) availability and the broad rights it awards to the consumer.

13.3.1. Objectives and Workflow

The primary objective of a digital library is to enhance the digital collection in a substantial way, by strategically sourcing digital materials, conforming to copyright permissions, in all possible standards or formats so that scalability and flexibility is guaranteed for the future and advanced information services are assured to the user community right from beginning. The digital library should also be able to integrate and aggregate the existing collections and services mentioned above with an outstanding client interface. This implies that the digital library system should also have a strong collection interface capable of embracing almost all the popular digital standards and formats and software platforms, in line with the underlying digital library technologies in vogue. This is crucial in the case of multimedia integration, which is again important as we may plan to also

host a digital audio and video library as part of the core library collection. Emphasis should also be given to maximize the efficiency and effectiveness of the information access and retrieval capabilities of the system by deploying Resource Description Framework (RDF) supplemented with popular descriptive metadata standards. The Internet also possesses, in addition to its mammoth proprietary information base, an invaluable wealth and a vast collection of public domain information products such as databases, books, journals, theses, technical reports, cases, standards, newsletters etc., scattered and distributed across the world. This treasure should also be explored to its maximum for collection building, based on the source and quality. Standard workflow patterns are to be identified for the system which include 'content selection', 'content acquisition', 'content publishing', 'content indexing and storage', and 'content accessing and delivery'. The system should also concern about such related issues, viz., preservation, usage monitoring, access management, interoperability, administration and management etc.

It is always desirable to have crosswalks between the digital catalogue of the library (OPAC) and the digital library, as the OPAC in most cases, acts as a stepping stone for effective information discovery in the library. It also facilitates a healthy bridging between the traditional and the digital library. MARC or any of its variant forms is the desired bibliographic standard recommended for the OPAC, for want of interoperability. Dublin Core (DCMI), MODS (Metadata Object Description Schema) or METS (Metadata Encoding and Transmission) are the recommended metadata format for the digital collection, and XML is the desired encoding scheme (XML). The XML encoding schemas and the related DTDs (Document Type Definition) strengthen the digital library on strong footing and the XSL (Extensible Stylesheet Language) transformations acts as dynamic gateways between the diverse data streams and the HTML front-end.

13.4.2. Selection of the DL Software

The software selection based on set parameters is an uphill task, as the technology itself is still emerging only. In general, what is desirable is a system that is flexible enough to fit the current digital information system as above and to accommodate future migration. It should be robust in technical architecture as well as the content architecture. The system should address all major digital library related issues such as 'design criteria', 'collection building', 'content organization', 'access', 'evaluation', 'policy and legal issues' including 'intellectual property rights'. The system should be in a position to embrace almost all predominant and emerging digital object formats and capable of supporting the standard library technology platforms, should be the major focus. It should provide two important user interfaces – a public user interface for presentation and a metadata creation interface for administration. The system should also provide a powerful search engine and the interface should be easy to navigate and there should be provision for customization.

There are many digital library softwares available, proprietary as well as open source, and most of them conform to international standards. As mentioned earlier, VTLS and ACADO are the commercial ones available and popular in the Indian market. Some of the popular Open Source Softwares for digital libraries, which are in use internationally, are 'DSpace', 'Dienst', 'Eprints', 'Fedora', 'Greenstone' etc.

13.3.3. Developing Digital Libraries using Open Source Software

Digital libraries do enable the creation of local content, strengthen the mechanisms and capacity of the library's information systems and services. They increase the portability, efficiency of access, flexibility, availability and preservation of content. A state-of-art Digital Library shall give

a real boost to the library's modernization activities and its endeavours to launch innovative digital information services to the user community. Once the information is made digital, it could be stored, retrieved, shared, copied and transmitted across distances without having to invest any additional expenditure.

World over there is increasing appreciation of the Open Access movement and the Open Source Software philosophies and for may a libraries it is a chosen decision, be it technical or financial reasons, not to go for a proprietary digital library software. One needs to evaluate some of the popular Open Source Software for digital libraries, which are in use internationally. 'Dienst', 'Eprints', 'Fedora', 'Greenstone' etc. are among the candidates for the preferred software. Obviously Greenstone outscores the group as a general purpose digital library software from the point of view of a multi-publication type, multi-format, multi-media and a multi-lingual practical digital library.

Some of the open software are discussed below.

13.3.4. E-Prints

E-Prints is the acknowledged world-leading Digital Repository software. The default configuration supports Open Access to scientific research materials with the aim of improving the visibility and impact of academic work. Although the default configuration aims to facilitate authors self-archiving their academic work, E-Prints can be configured to manage any collection of digital content. Christopher Gutteridge is the lead developer for E-Prints. It enables research to be accessible to all, and provides the foundation for all academic institutions to create their own research repositories.

As the World Wide Web grew in popularity in the mid-1990's, a number of sites grew up dedicated to disseminating

academic research. Foremost among these was the High Energy Physics archive (at the time known as the Los Alamos archive after its then location at the US National Research Laboratory in New Mexico). At a meeting of interested researchers in October 1998, the issue of interoperation among these various sites was discussed and the Open Archives Initiative began. At that meeting, E-Prints was proposed as an off-the-shelf package that researchers could use to set up their own archives.

With the new E-Prints Community initiative institutions will be able to work closely with new and existing users to address their needs and concerns, and allow them to help set priorities. E-prints is working towards a more modular design, which would make it easier for the community to build and share extensions.

13.3.5. Fedora open

Fedora is a general purpose repository service. The Fedora project is devoted to the goal of providing open-source repository software that can serve as the foundation for many types of information management systems. The software demonstrates how distributed digital information management can be deployed using web-based technologies, including XML and web services.

Fedora open source software gives organizations flexible tools for managing and delivering their digital content. Fedora is developed jointly by The University of Virginia Library and Cornell University. Support for the Fedora Project comes from the Andrew W. Mellon Foundation. Prior support for Fedora came from the National Science Foundation.

It is a powerful digital object model that supports multiple views of each digital object and the relationships among digital objects. Digital objects can encapsulate locally-managed content or make reference to remote content.

Dynamic views are possible by associating web services with objects. Digital objects exist within a repository architecture that supports a variety of management functions. The functions of Fedora, both at the object and repository level, are exposed as web services. These functions can be protected with fine-grained access control policies.

This unique combination of features makes Fedora an attractive solution in a variety of domains. Some examples of applications that are built upon Fedora include library collections management, multimedia authoring systems, archival repositories, institutional repositories, and digital libraries for education.

13.3.6. LOCKSS

LOCKSS that stands for "Lots of Copies Keep Stuff Safe" is open source software that provides institutions with a way to collect, store, and preserve access to their own, local copy of content. LOCKSS was developed by Stanford University, and it is currently maintained by the Stanford University LOCKSS Program Management Office with support from the LOCKSS Alliance.

LOCKSS runs on standard desktop hardware and requires minimal technical administration. Once installed, the LOCKSS software converts a personal computer into a digital preservation box that creates low-cost, persistent, accessible copies of e-journal content as it is published. The accuracy and completeness of content stored in a LOCKSS box is assured through a robust and secure, peer-to-peer polling and repository system. A LOCKSS box performs the following four functions:

- It collects newly published content from the target e-journals using a web crawler similar to those used by search engines.

- It continually compares the content it has collected with the same content collected by other boxes, and corrects any differences.
- It acts as a web proxy or cache, providing browsers in the institution's community with access to the publisher's content or the preserved content as appropriate.
- It provides a web-based administrative interface that allows the institution staff to target new journals for preservation, monitor the state of the journals being preserved, and control access to the preserved journals.

13.3.7. VALET for ETDs

Networked Digital Library of Theses & Dissertations (NDLTD), founded in 1996, is a federation of more than 190 NDLTD members, comprising of 160 universities, 6 consortia, and 24 other institutions around the world. NDLTD promotes the creation, archiving, and distribution of electronic theses and dissertations.

The UNESCO Guide for Creating Electronic Theses and Dissertations (ETDs) aims to help all those interested in projects and programs involving ETDs. This work is a living document that will continue to be updated in connection with the work of the Networked Digital Library of Theses and Dissertations. It was born as a result of the support provided by UNESCO in grants given to Virginia Tech and University of Montreal. It was prepared by an international team of faculty and staff coordinated by Prof. Shalini Urs. Its organization and content are the result of the editorial labour of Joseph Moxley.

Joining and participating in the Networked Digital Library of Theses and Dissertations, NDLTD is one of the best ways to understand the concepts regarding digital libraries. It

directly involves students pursuing graduate education by having them develop their theses or dissertations (TDs) as electronic documents, that is, as electronic theses or dissertations (ETDs). There are two main types of ETDs. One type, strongly preferred since students learn as they create them, are author created and submitted works. In other words, these are documents that are prepared by the (student) author (as is typical in almost all cases) using some electronic tools, e.g., Microsoft Word, LaTeX, and then are submitted in their approved and final electronic form to their university or agent thereof. Typically, the raw form of the document, e.g., in Word's ".doc" format is converted into a form that is easy to preserve, archive, and make accessible for future readers, e.g., that follows standards, such as PDF or XML. That form is submitted, typically over a network connection, usually with related metadata, i.e., "data about data", often cataloging information as one might find in a library catalogue, including title, year, author, abstract, and descriptors. Once submitted, such ETDs can be "discovered" by those interested, as a result of searching or browsing through the metadata, or by full text searching through the full document and may be even ETDs–electronic theses and dissertations constitute a significant fraction of e-print archives and NDLTD has devised a new standard for metadata specific to ETDs (ETDMS). NDLTD has also adopted use of the OAI protocol for metadata transfer. NDLTD has developed the NDLTD Union Archive to function as both a provider of services and a provider of data. Two service providers that harvest from the NDLTD Union Archive are the official NDLTD Union Catalogue (hosted by VTLS) and the experimental Electronic Theses/ Dissertations OAI Union Catalogue based at OCLC.

VTLS announces VALET for ETDs, a Free, Open-Source, web Submission Solution for Electronic Theses and Dissertations Blacksburg, VA. VALET for ETDs is available free as open-source software. VALET is a web submission

solution for managing electronic theses and dissertations, which uses customizable, form-based templates to allow ETDs to be submitted into an underlying FEDORA repository. VALET is a fitting product offering from a company that boasts a tradition of leadership in the industry and is a good tool for libraries and librarians.

The Australian Research Repositories Online to the World (ARROW) Project, led by Monash University in Australia, is to develop VALET for ETDs. This open-source product is simple, flexible, adaptable and easy to implement. A typical process allows for thesis submission by students, editing and approval by faculty, approval by the graduate school and final deposit into a FEDORA-based, institutional repository. The software minimizes errors and offers instant, form based validation. It also offers multi-level security for students, faculty and administration. When a thesis enters the repository, the software automatically creates standardized metadata. It is preconfigured to allow users to choose Dublin Core or ETD-MS, but it can support other metadata standards or schemas, such as MARCXML. VALET helps streamline the submission process while increasing the quality of the final ETD resource. While the initial version supports submission via a web interface, the next version will also support submission via e-mail.

FEDORA™ is packaged with VALET. FEDORA™ was conceived and designed at Cornell University with funding from DARPA and the National Science Foundation. The Andrew W. Mellon Foundation is funding the open-source FEDORA™ software, being developed jointly by the University of Virginia and Cornell University. VTLS created VALET in conjunction with the ARROW Project in Australia and used the digital theses programs at Virginia Tech and the Australian Digital Theses (ADT) Program as models. VTLS have customer base of more than 900 libraries in over 35 countries.

VIRTUA is their premier ILS solution. VTRAX is their RFID technology offered through partnerships with Tagsys, TI and FKI Logistex. VITAL is their institutional repository solution which provides cutting edge software and services for Digital Libraries.

13.3.8. Ganesha Digital Library

Ganesha Digital Library enables institutions or personals to share their knowledge as well as simultaneously access and utilize knowledge. Ganesha Digital Library or GDL is a tool for managing and distributing digital collection using web-based technology. GDL enables institutions or persons to share their knowledge as well as simultaneously access and utilize knowledge in Indonesian "giant memory" in the form of network of Indonesia DLN digital libraries. It can be accessed from http://gdl.itb.ac.id.

The important features of Ganesha Digital Library Software are :

Distributed Knowledge Management: Knowledge management done through distribution, by partner in each digital library server.

Centralized Knowledge Distribution: To make information closer to user, GDL Partner Server can benefit GDL Hub Server (Central Server) in order to disseminate metadata to all Digital Library Partner Server within IndonesiaDLN.

Online Member Registration: User registration can be done online on the web. Validation number sent by e-mail to make sure to make any contact to user in the future.

Roaming Membership: Once user is registered in any GDL server, he/she can use his/her account in every online GDL server.

Searching: GDL supports fast information searching

and detail to all managed metadata.

Category-Based Organization: Organizing collection done with creating category and sub-category. This makes browsing easier.

Upload Metadata and Files: Every member can publish his/her digital collections by submitting metadata form and upload the file easily.

Personal Directory: Every member automatically possesses personal directory which he/she can freely manage.

Review Forum: Every uploaded article can be set whether asked for review by visitor or not. Visitor can post and read review. Contributors will receive email notification if there is any review posted.

Access Restriction: Uploaded articles can be arranged whether accessed by Intranet of any particular group or open to the Internet.

Image Thumbnail: Image file (jpg and PNG) can be appeared in smaller size as thumbnail at abstract page.

Knowledge Organization: Member, editor, and knowledge officer can organize where to put uploaded articles to appropriate categories in regard to their privileges.

News: Editor and knowledge officer can upload fresh news to appear in GDL News easily.

Synchronization: GDL Partner Server can upload and download file and metadata to and from GDL Central Server through synchronization facilities. Membership and publisher information can also be synchronized.

Member and Group Administration: Administrator can manage member data, create group, and regulate editor access right.

Statistics: Administrator can view statistics of knowledgebase content and its contributors.

Advertisement: Administrator can show advertisement banner completed with keyword and subject matching facilities.

Dublin Core / IndonesiaDLN Metadata: GDL utilizes IndonesiaDLN Metadata Standard that is based on Dublin Core metadata standard. It opens possibilities of information exchange with other system on the Internet that also utilizes Dublin Core.

XML Based Transaction: Data transaction between client and server within GDL-Network uses XML format. It makes it possible for further development of GDL to become more extensive web- based networking application in the future.

CD-ROM Enabled: GDL uses Apache, MySQL, and PHP free-software that can be run directly from CD-ROM to make easy information dissemination.

Ganesha purposes for:

- Managing Scholar Resources for theses, dissertations, research reports, journal, publication, etc.
- Promoting the SME's Products through E-mail.
- Managing the Art Work and Heritage Resources for pictures, songs, videos, etc.
- Managing the expertize directory of people and organizations.
- Extend the metadata schema for other purposes easily.
- And the most important, develop distributed knowledge repository network.

But the most popular software are Dspace and

Greenstone. They are discussed in details as below :

13.3.9. DSpace

DSpace is a digital asset management software jointly developed by Hewlett-Packard and MIT Libraries, and it is arguably one of the appreciated open source software deployed worldwide for building digital institutional repositories that captures, stores, indexes, preserves, and redistributes content in digital formats. DSpace provides the institutions and universities operate an open access and interoperable institutional repository at the local level. It is also intended to serve as a repository back up for future development to address long term preservation and remote/online access issues. The system was launched during late 2002 as a live service hosted by MIT Libraries, and the source code made publicly available according to the terms of the BSD open source license, with the intention of encouraging the formation of an open source community around DSpace.

DSpace is now freely available to other institutions to run as it is, or to modify and extend as they require to meet local needs. From the outset, HP and MIT designed the system to be run by institutions other than MIT, and to support federation among its adopters, in both the technical and the social sense.

DSpace was an attempt to address a problem that MIT faculty have been expressing to the Libraries for the past few years. As faculty and other researchers develop research materials and scholarly publications in increasingly complex digital formats, there was a need to collect, preserve, index and distribute them. This was a time-consuming and expensive chore for individual faculty and their departments, labs, and centers to manage themselves. The DSpace system provides a way to manage these research materials and publications in a professionally maintained repository to give

them greater visibility and accessibility over time.

DSpace supports every function that a research organization needs to run a production digital repository service, but as simply as possible. The project focus was on building a production quality system. It complements and was influenced by previous research in computer science and digital library architectures. With the help of developers at other institutions that adopt DSpace under its open source license it is possible to add features and improve the different functions of the system.

Metadata : DSpace uses a qualified Dublin Core metadata standard for describing items intellectually-specifically, the Libraries Working Group Application Profile. Only three fields are required: title, language, and submission date, all other fields are optional. There are additional fields for document abstracts, keywords, technical metadata and rights metadata, among others. This metadata is displayed in the item record in DSpace, and is indexed for browsing and searching the system – within a collection, across collections, or across Communities. For the Dissemination Information Packages (DIPs) of the OAIS framework, the system currently exports metadata and digital material in a custom XML schema while other work with the METS community to develop the necessary extension schemas for the technical and rights metadata about arbitrary digital formats.

User Interface : DSpace's current user interface is web-based. There are several interfaces – one for submitters and others involved in the submission process, one for end-users looking for information, and one for system administrators.

The end-user or public interface supports search and retrieval of items by browsing or searching the metadata. Once an item is located in the system, retrieval is accomplished by clicking a link that causes the archived

material to be downloaded to the user's web browser. "Web-native" formats – those which will display directly in a web browser or with a plug-in can be viewed immediately; others must be saved to the user's local computer and viewed with a separate program that can interpret the file, e.g., a Microsoft Excel spreadsheet, an SAS dataset, or a CAD/ CAM file.

Workflow : DSpace is the first open source digital repository system to tackle the complex problem of how to accommodate the differing submission workflows needed for a multi-disciplinary system. The system models "e-people" who have "roles" in the workflow of a particular community in the context of a given collection. Individuals from the Community are registered with DSpace, then assigned to appropriate roles.

For example, a department may choose to have two collections – one for working papers and another for datasets. They may then decide that any member of the faculty can deposit items to either collection directly, and that any member of the general public can have access to these collections. In this example the workflow is very simple, and the only "role" is that of submitter.

In a more complex example, the same department may have a working paper collection that requires tight editorial control by the head of the department. In this case, they may choose to again designate all faculty as "submitters", but also designate a small group of people as "reviewers", an administrative staff person as a "metadata editor", and the head of the department as the final "coordinator". An item deposited by a faculty member would then go through a process of review, cleanup and approval before finally being deposited to the relevant DSpace collection. Each person with a role to play in this process is notified of the new submission, and goes to a personal workspace in the system to perform their assigned task. Items that do not make it

through the process are not archived in the system.

Technology Platform : DSpace was developed to be open source, and in such a way that institutions and organizations with minimal resources could run it. The system is designed to run on the UNIX platform, and comprises other open source middleware and tools, and programs written by the DSpace team. All original code is in the Java programming language. Other pieces of the technology stack include a relational database management system (PostgreSQL), a Web server and Java servlet engine (Apache and Tomcat, both from the Apache Foundation), Jena (an RDF toolkit from HP Labs), OAICat from OCLC, and several other useful libraries. All leveraged components and libraries are also open source software. Libraries are bundled where possible.

DSpace System Architecture : The DSpace architecture is a straight forward three-layer architecture, including storage, business, and application layers, each with a documented API to allow for future customization and enhancement. The storage layer is implemented using the file system, as managed by PostgreSQL database tables. The business layer is where the DSpace-specific functionality resides, including the workflow, content management administration, and search and browse modules. Each module has an API to allow DSpace adopters to replace or enhance that function as desired. Finally, the application layer covers the interfaces to the system – the web user interface and batch loader, in particular, but also the OAI support and Handle server for resolving persistent identifiers to DSpace items.

Open Archives Initiative (OAI) : The system has implemented the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) to further its goal of supporting interoperability with other DSpace adopters, and with other digital repositories, preprint, and e-print servers.

DSpace uses the OCLC OAICat to accomplish this, and is currently exposing Dublin Core metadata for every item in the system. For material that is restricted to local access, the item metadata is exposed to OAI harvesters but the system may enforce the restriction when a user requests the associated bitstreams. DSpace at MIT has recently been added to the OAI registry, and as the system is deployed at other institutions, it is intended to investigate what added-value services might be built on top of this promising piece of infrastructure to work across the Federation. For example, we may examine the possibility of defining and building preprint and e-print collections for a particular academic discipline with individual items distributed among many institutionally-based multidisciplinary repositories, all OAI compliant.

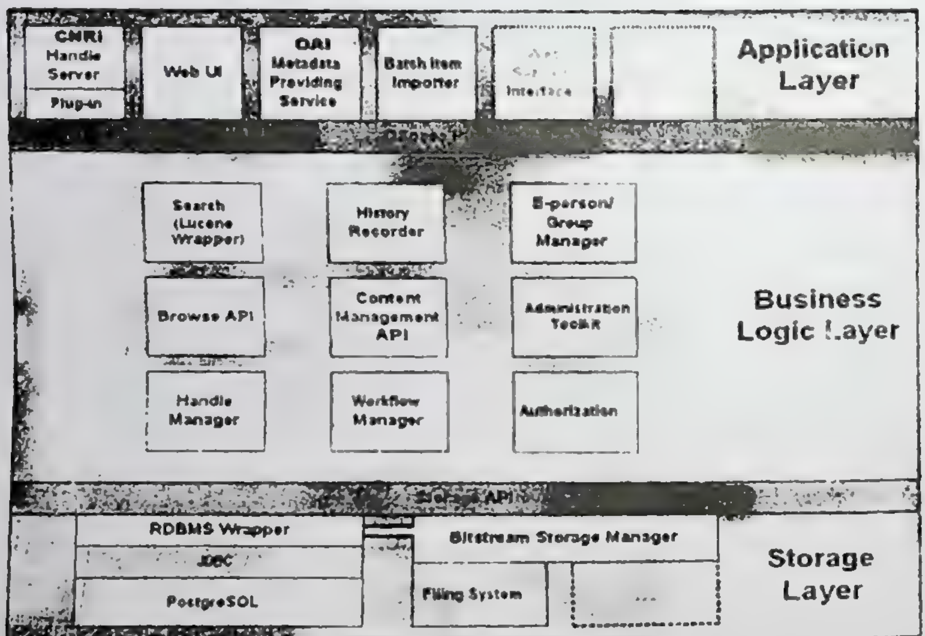


Fig. 13.1. DSpace Technical Architecture

Persistent Identifiers (Handles) : The goal of persistent digital repositories is that it be possible to find and retrieve deposited items far into the future. In particular, it is considered

crucial that citations to archived material, whether found in printed articles or online, remain valid for long periods. To this end, DSpace chose to implement CNRI (Corporation for National Research Initiatives) handles as the persistent identifier associated with each item. Its Handle System® covers assignment, management, and resolution of these persistent identifiers. Although CNRI has not registered with the IETF (Internet Engineering Task Force) for an official namespace, handles are compliant with the IETF's Uniform Resource Name (URN) specification.

Handle resolution can be done using a special client, or handles can be packaged in the form of URLs and a proxy server used to resolve these into the handle form, which is, in turn, resolved to the local system location for the item. This second approach is the one that is used in DSpace. The main alternative to using handles is to use persistent URLs with HTTP redirection to allow items to move around over time.

The DSpace Federation : Since the very beginning, the DSpace project intended to make its system open source and to actively promote it to other institutions, Why? There are many reasons for taking this approach:

- Developing a critical corpus of content that represents the intellectual output of the world's leading research universities.
- Promoting the continued development of the DSpace service through the open source community.
- Promoting interoperability of archival repositories and long-term preservation of scholarly work.

In 2002, MIT formed collaborative partnerships with a small number of other academic research institutions in the US, UK, and Canada, to address some specific questions such as – what will it take to successfully deploy the system at another institution? How much localization, how much

customization, and how much time and effort are needed? What services can be defined to leverage the digital collections of these institutions, and how can they be implemented in DSpace? What sort of organization will the Federation become: A consortium? A new membership organization? An informal and loose collaboration? Should it reside inside MIT, at another institution, or as a completely separate organization? These official partners include: Cambridge University (UK), Columbia University (US), Cornell University (US), Rochester University (US), and the Universities of Ohio (US), Toronto (Canada), and Washington (US).

In addition to these formal collaborations, many organizations have downloaded the DSpace system and many of these are in the process of evaluating it for adaptability to their local requirements. Clearly there is great need for a system like DSpace, and as we explore the definition of the DSpace Federation over the coming year, we hope to get feedback and advice from many of these institutions about how the system should evolve and how to make it sustainable beyond MIT.

MIT Libraries' DSpace Implementation : DSpace is a system, a tool, and a platform for collecting, managing, indexing, and distributing digital items. Exactly how it is used, for what sort of digital material, by whom, for how long, and so on, are the policy issues to be decided by each organization adopting the system, in order to make the difference between system and policy more transparent, and to help other institutions get started. MIT is openly sharing its own policy decisions with regard to DSpace. It is hoped that, while we acknowledge that our policies may not work well for other institutions, and will certainly evolve over time, they may offer guidance to others regarding the depth and breadth of issues that should be considered.

Collections Scope : The original goal of DSpace was to capture the faculty's intellectual output in digital formats–research papers, other documents, datasets, images, audio/visual material, databases, or any other format they deem important. This goal led to following important policies:

- only faculty research would be accepted – not student material, not institutional records, and
- not material from non-faculty researchers without sponsorship from faculty, and
- faculty would choose what would be submitted – within certain general constraints set by the Libraries and Archives.

Beyond faculty-authored documents and data, another category of material has taken the spotlight for possible support by DSpace – educational material, or "Learning Objects". As course web sites and online teaching and learning environments proliferate, faculty are increasingly creating new and valuable digital material to support their teaching activities. These can take the form of traditional lecture notes, sample exams, and course calendars, but also include things like complex simulations and visualizations, multimedia presentations, or videos of key lectures.

As a matter of local policy, the MIT Libraries accept this type of material and is actively collaborating with two MIT-based projects in this area – the Open Knowledge Initiative (OKI) and OpenCourseWare (OCW). For OKI, DSpace could serve as an active repository of course "content items"–those items of persistent, ongoing value, e.g., a physics simulation used regularly in various courses. The OKI project is developing APIs to support interoperability across OKI-compliant course management systems and OKS-compliant digital repositories. For OCW, DSpace will collect older course web sites so that courses can be examined and course

material found after the course is no longer actively taught.

Faculty Engagement : There are several ways to describe the value of an institutional repository to the faculty who will contribute material, and the administration that will support the effort. And it is critical to explain those benefits, and to market the service, to both constituencies. As a multidisciplinary repository that represents the scholarship of MIT, DSpace at MIT showcases the international prominence of our faculty both individually and collectively. The interdisciplinary content of the archive should attract a wider audience than a repository dedicated to one individual discipline. Moreover, it provides currently lacking service to the growing body of interdisciplinary research efforts. The ability to distribute research results quickly will emphasize the cutting-edge nature of MIT's research, and supports the mission of the Institute to generate, disseminate, and preserve knowledge.

The MIT faculty's research output will be valuable to researchers far into the future, but preserving digital material, comprising of publications, datasets, images, visualizations, and so on is extremely difficult. To ensure long-term access to this important scholarship the MIT libraries will manage DSpace as a preservation archive, keeping this material accessible, and often immediately usable, far into the future.

The Libraries provide guidance in establishing new Communities, and assistance to faculty and others in using the system. DSpace was envisioned by the MIT Libraries as a continuation of their mission to collect, make available, and preserve important scholarly material of all kinds, especially that of MIT's own faculty and research community. The libraries are working to extend their services in the digital era, to reflect current trends in scholarly communication and education, and to offer new means of distributing research material that are enabled by network technology.

Over the past few years MIT has been placing new emphasis on educational technology with initiatives such as OpenCourseWare and Open Knowledge Initiative. Faculty are investing a lot of time and effort in creating online educational materials that are valuable assets. DSpace is collaborating with the major educational technology initiatives at the Institute, including OpenCourseWare, so that storing, relocating, reusing and repurposing course content becomes reliable and easy.

Pre-publication, expect to continue to work for the institution and to store and deliver preprints and eprints from the host institution and could support virtual collections from different academic disciplines by means of federation across large numbers of participating institutions. Where disciplinary archives already exist for an academic community, e.g., the arXiv system at Cornell University. DSpace could be made to automatically submit copies of relevant documents to these centralized archives during the local deposit process.

Transition Team and Business Plan : The Libraries have formed a DSpace Transition Team consisting of project staff and senior library staff from key departments, e.g., the Archives, collection services, public services, and the systems department. This group was charged with figuring out how to deploy DSpace as a new service of the MIT Libraries – the necessary policies, staffing requirements, communications strategies, management and governance structures, training plans, and operational requirements. The participation in this group proved to be a useful vehicle for the library staff to become more familiar with the system, and discussions of these various issues were invaluable to the development of the production DSpace service.

Participating in the Transition Team group were two senior business consultants funded by a grant from the Andrew W. Mellon Foundation to write a formal business plan

for a sustainable DSpace system at MIT. Their work consisted of compiling the results of the transition team deliberations and decisions, incorporating the work into detailed cost information for system operation, and outlining possible revenue options.

The major conclusion of this planning process was that DSpace at MIT would be offered as a combination of subsidized core services that built into the Libraries' operating budget, and cost-recovered premium services that would allow the Libraries to meet varying unique needs for DSpace from particular Communities, e.g., exceptional amounts of disk storage, assistance with metadata creation, or conversion of files to supported formats.

DSpace Installation : Mainly six prerequisite softwares are essential for running a DSpace server, viz., (i). Java SDK, (ii). Apache, (iii). Tomcat, (iv). Apache Ant (v). PostgreSQL and vi). the DSpace software itself. These softwares are to be installed in sequence also. It is very important to setup corresponding HOME variables and modify the PATH variables after the installation of Java SDK and Apache Ant respectively. After the installation of PostgreSQL, we need to create a database named 'dspace' owned by user 'dspace' with UNICODE encoding. To load DSpace you have to start the three services, namely, Apache, Apache Tomcat and the PostgreSQL Database server.

DSpace Configuration : Primarily configuration of DSpace Software is done by editing the file 'dspace.cfg' located at \dspace\config, which contains basic information about a DSpace installation, including system path information, network host information, SMTP mail server address and other things like site name etc. We configured 'dspace.url' line in the 'dspace.cfg' file with the desired DSpace site address, i.e., the URL 'dspace.iimk.ac.in'.

For mailing purposes we need to modify the 'mail.server'

configuration item in 'dspace.cfg' file on a case to case basis. There could be two instances here - (i). the Dspace server itself has got a mail server configured and running (say, sendmail) or (ii). the mail server is running elsewhere. You need to furnish the SMTP mail server address as per the situation, in the 'dspace.cfg' file, located at c:\dspace\config\. If the Institute has a separate mail server, this server will have to relay the DSpace server IP.

Communities and Collections : In DSpace, a digital repository is organized in terms of communities, sub-communities and collections. In other words, communities, sub-communities and collections can be arranged hierarchically. We can follow the subject approach for creating communities and publication type classification for creating collections within each community.

Collection Building : Adding content to DSpace is quite easy and straight forward. As DSpace has a workflow based remote publishing facility, authorized users can submit their items from their own client machines. You will need to be logged in to DSpace before you can submit. Most collections will also require specific authorization for you before you can submit items to it.

After starting a submission, you will be led through a seven-step workflow process. These include some basic metadata descriptions about the materials first, then several screens where you describe the details, then file uploads, a verification screen, a license granting screen and finally a submission complete screen. The following figure (Fig. 13.2) shows the workflow process of item submission in DSpace.

After submission completion, the submitted item will go through some formalities like review, edit, or approve according to the collection's policies. This means that the submitted item might not go directly into the main archive, before the validation process.

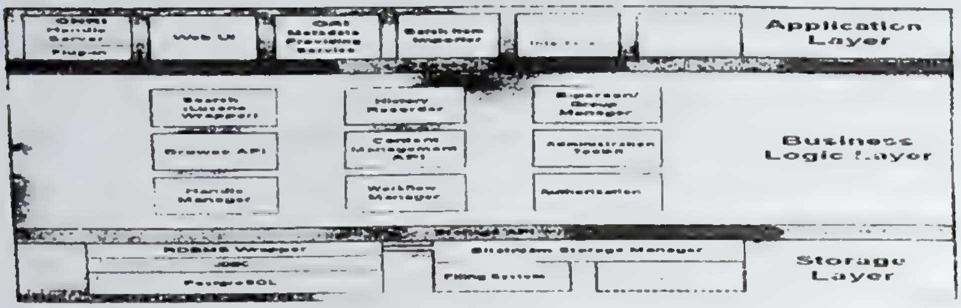


Fig. 13.2. DSpace Collection Submission Workflow

DSpace Customization : DSpace is implemented by using Java Servlets and JavaServer Pages 7which produce the HTML pages for DSpace. As JSP coding is similar to HTML, changing the look and feel of DSpace page is very easy. You can make your own header image by replacing the existing 'dspace-blue.gif' located at \tomcat5\webapps\dspace\image\ with customized image. The news-top.html file located at \dspace\config\ is edited for giving an introductory note about the repository in the DSpace home page. By editing the news-side.html located at \dspace\config\, we added information about library related programmes/seminars/workshops etc. You can also configured the item count against communities and collections by setting the 'webui.strengths.show' configuration item's value to 'true' in the 'dspace.cfg' file. DSpace uses a 'styles.css.jsp' file which is located at \Tomcat5\webapps\dspace\, which is modified for altering font type, size and colours from default style. The home page of the IIM Kozhikode's DSpace repository is shown in Fig. 13.3.

DSpace Administration : The administrator has to do a wide range of tasks for the successful maintenance of a digital repository. When you first configure a digital repository using DSpace, begin with creating Communities and Collections. Policy setting is the most important step in the administration of a digital repository. DSpace administration

provides a number of archive control features. You can literally control the access, usage and preferences of each and every collection as well as users or community through this versatile tool. You have to take a decision with regard to whom or which group who can submit digital items to each collection. In addition, you also have to take a decision as to who or which groups of members (E-people) are authorized to review, approve and modify metadata while submission / collection building.

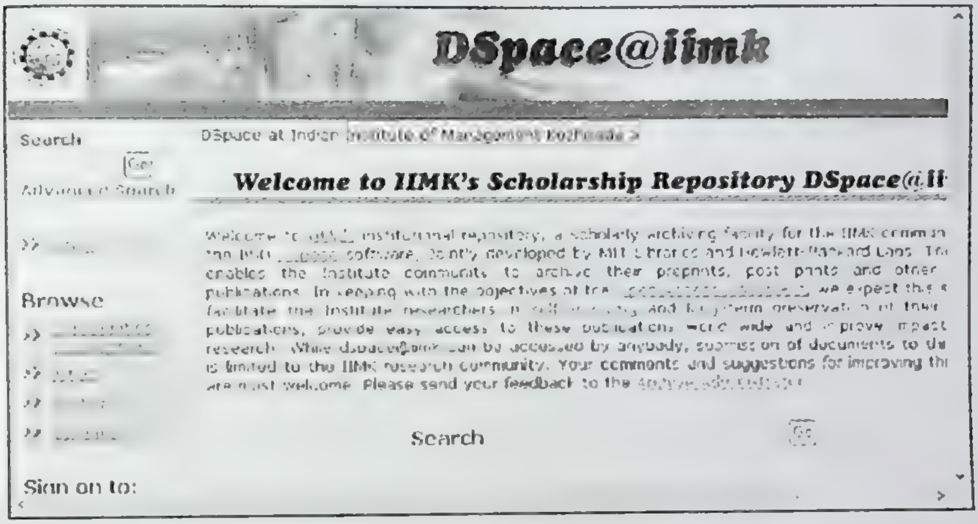


Fig. 13.3. DSpace @ IIM Kozhikode

E-People : Collection items can be accessed by everyone, but users must be authenticated to perform functions such as submission, email alert or administration. DSpace calls its registered members as *e-people.* DSpace holds the details about each e-person such as their e-mail address, first and last names etc. E-people can be members of 'groups' to make administrator's tasks easier when manipulating authorization policies.

Publishing the Archive on the Internet : This is one of the simplest yet most interesting and enjoying step in the development of your IR. You need to identify a suitable domain name, configure the same, and give the value at 'dspace.url'

in the 'dspace.cfg' file, say 'dspace.url = https://dspace.iimk.ac.in:8080/'. You will then need to register the domain with a public IP. By default, DSpace is running on 8080 port, i.e anybody accessing 'dspace.mydomain' will have to give http://dspace.mydomain:8080. If you want to avoid 8080, you have to configure port forwarding 8080 to 80 (the default port) using a firewall. You can now access the archive as http://dspace.mydomain.

DSpace Lifeline : DSpace's mailing lists are very useful and powerful, and there are three active listservs maintained by DSpace which shares and clarifies user experiences and stories dealing with real life DSpace situations. The 'dspace-general' list is reachable through 'dspace-general@mit.edu', or subscribed to by visiting 'http://mailman.mit.edu/ mailman/listinfo/dspace-general' and following the instructions to subscribe. Beginners are advised to first check the 'FAQ' (http://wiki.dspace.org/EndUserFaq) or the 'archive' (http://mailman.mit.edu/ pipermail/dspace-general/) to see if the question in hand has been answered before. For systems professionals and developers there are two more Lists, viz., the 'DSpace-Tech' (technology discussion list) and the 'DSpace-Devel' (developers' list), and both of them are very informative and supportive to post questions or contribute one's expertize to other developers working with DSpace, and to share ideas and discuss code changes to the open source platform. To subscribe to these, you may-visit 'http://lists.sourceforge.net/lists/listinfo/dspace-tech' and 'http://lists.sourceforge. net/lists/listinfo/dspace-level' respectively. Also, there are separate archives for these two lists for getting access to the old postings.

The e-List managed by DRTC is very active and useful from India. You can subscribe to the List via the Web at http://drtc.isibang.ac.in/mailman/listinfo/dlrg or by sending a message with subject or body 'help' to dlrg-request@drtc.isibang.ac.in.

DSpace Wiki (http://wiki.dspace.org/) is also a very useful reference tool which is worth looking at before we send out messages to eLists, as there could be possible solutions already provided in the Wiki.

To sumup, it can be said, DSpace provides long-term physical storage and management of digital items in a secure, professionally managed repository including standard operating procedures such as backup, mirroring, refreshing media, and disaster recovery. It assigns a persistent identifier to each contributed item to ensure its irretrievability far into the future. DSpace provides a mechanism for advising content contributors of the preservation support levels they can expect for the files they submit.

DSpace allows contributors to limit access to items in DSpace, at both the collection and the individual item levels. New versions of previously submitted DSpace items can be added and linked to each other, with or without withdrawal of the older item. Multiple formats of the same content item can be submitted to DSpace. Besides, the DSpace submission process allows for the description of each item using a qualified version of the Dublin Core metadata schema.

13.3.11. Greenstone

Greenstone is another suite of software for building and distributing digital library collections. It is not a digital library but a tool for building digital libraries, which provides a new way of organizing information and publishing it on the Internet in the form of a fully-searchable, metadata-driven digital library. It has been developed and distributed in cooperation with UNESCO and the Human Info NGO in Belgium. It is open-source, multilingual software, issued under the terms of the GNU General Public License. Its developers have received the 2004 IFIP Namur award for "contributions to the awareness of social implications of information technology,

and the need for an holistic approach in the use of information technology that takes account of social implications."

Greenstone incorporates an interface that makes it easy for people to create their own library collections. Collections may be built and served locally from the user's own web server, or remotely on a shared digital library host. End users can easily build new collections styled after existing ones from material on the Web or from their local files, and collections can be updated and new ones brought on-line at any time.

Greenstone Digital Library Software provides a new way of organizing information and making it available over the Internet. The collections of information comprise large numbers of documents (typically several thousand to several million), and a uniform interface is provided to them. Libraries include many collections, individually organized – though bearing a strong family resemblance. The structure of a collection is determined by a configuration file. Existing collections range from newspaper articles to technical documents, from educational journals to oral history, from visual art to videos, from MIDI pop music collections to ethnic folksongs.

Its technical features may be discussed under the following heads.

Platforms : Greenstone runs on all versions of Windows, and Unix, and Mac OS-X. It is very easy to install. For the default Windows installation absolutely no configuration is necessary, and end users can routinely install Greenstone on their personal laptops or workstations. Institutional users run it on their main web server, where it interoperates with standard web server software.

Interoperability : Greenstone is highly interoperable using contemporary standards. It incorporates a server that can serve any collection over the Open Archives Protocol for

Metadata Harvesting (OAI-PMH), and Greenstone can harvest documents over OAI-PMH and include them in a collection. Any collection can be exported to METS (in the Greenstone METS Profile, approved by the METS Editorial Board and published at http://www.loc.gov/standards/mets/mets-profiles.html), and Greenstone can ingest documents in METS form. Any collection can be exported to DSpace ready for DSpace's batch import program, and any DSpace collection can be imported into Greenstone.

Interfaces : Greenstone has two separate interactive interfaces, the Reader interface and the Librarian interface. End users can access the digital library through the Reader interface, which operates within a web browser. The Librarian interface is a Java-based graphical user interface (also available as an applet) that makes it easy to gather material for a collection, enrich it by adding metadata, design the searching and browsing facilities that the collection will offer the user, and build and serve the collection.

Metadata Formats : Users define metadata interactively within the Librarian interface. These metadata sets are predefined: Dublin Core (qualified and unqualified) , RFC 1807, NZGLS (New Zealand Government Locator Service), AGLS (Australian Government Locator Service). New metadata sets can be defined using Greenstone's Metadata Set Editor. "Plug-ins" are used to ingest externally-prepared metadata in different forms, and plug-ins exist for XML, MARC, CDS/ISIS, ProCite, BibTex, Refer, OAI, DSpace, METS.

Document Formats : Greenstone basically supports all popular file formats and media. Plug-ins are also used to ingest documents. For textual documents, there are plug-ins for PDF, PostScript, Word, RTF, HTML, Plain text, Latex, ZIP archives, Excel, PPT, Email (various formats), source code. For multimedia documents, there are plug-ins for

Images (any format, including GIF, JIF, JPEG, TIFF), MP3 audio, Ogg Vorbis audio, and a generic plug-in that can be configured for audio formats, MPEG, MIDI, etc.

Greenstone Installation : The GNU Public License version Greenstone can be downloaded from 'http://www.greenstone.org' or 'http://sourceforge.net/index.php'. You can download the binaries for Linux or Windows. The associated softwares such as Java Runtime Environment (JRE) and the Imagemagick also to be downloaded. A graphical tool is used for collection building and configurations and customization. This is called the Greenstone Librarian Interface (GLI) and it requires the Java Runtime Environment (JRE). The latest version pertaining to Volume 2 release of Greenstone as on January 2009 is V.2.81.

Click on "gsdl-2.81-win32.exe". The Install Shield Wizard will begin the installation. Accept all the term of license agreement by clicking on <Yes> button. Click on <next> to install GSDL in the default folder, which is C:\program files\greenstone2. Choose the type 'Local Library'. By default, Local Library is highlighted. Set the Admin Password as "admin" (you can later change it). Installation wizard now starts copying the required files from the GSDL folder. Click on the Finish button to finish GSDL installation. To check whether your installation is proper, Click on 'Start → Programs → Greenstone Digital Library → Greenstone Digital Library'. Click on Enter Library in the 'Dialog Box' and Your Browser should display The GSDL Homepage.

The 2.81 version comes with Imagemagick and Ghostscript softwares bundled with it and hence we need not install them separately.

To address the broad demands of digital libraries, the system is public and extensible. Issued under the Gnu public license, users are invited to contribute modifications and enhancements. Widely used internationally, Greenstone

supports collections in many different languages. Greenstone CD-ROMs have been published by the United Nations and other humanitarian agencies for distribution in developing countries.

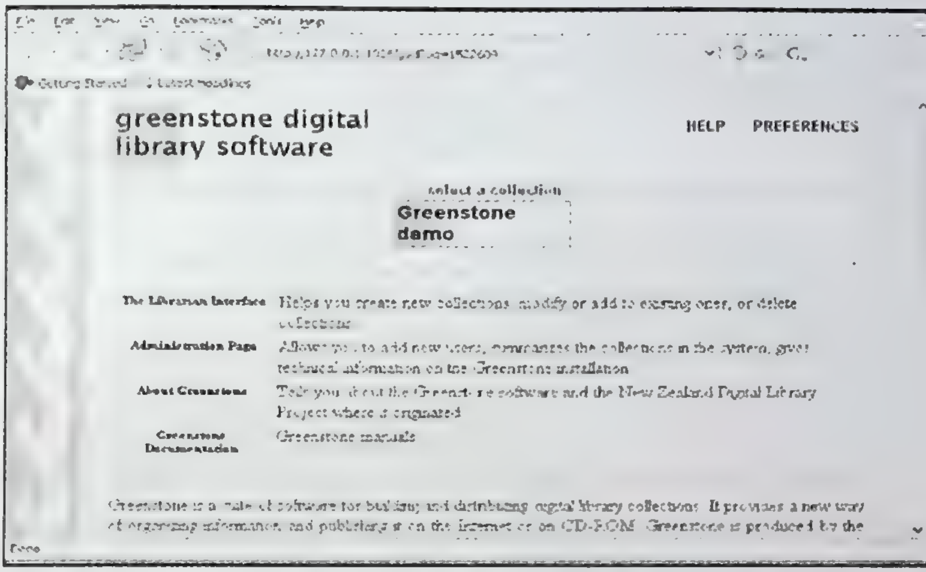


Fig. 13.4. GSDL Home Page

Information collections built by Greenstone combine full-text search with browsing indexes based on different metadata types. There are several ways for users to find information, although they differ between collections depending on the metadata available and the collection design.

Searching is full-text, and – depending on the collection– users select indexes built from different parts of the full text or the metadata. Some collections have separate indexes of full documents, sections, paragraphs, titles, and section headings, each of which can be searched for particular words or phrases. When browsing, users examine data structures created from metadata: lists of authors, titles, dates; hierarchical classifications; and so on. Structures for both searching and browsing are specified by instructions in the

configuration file, and can be rebuilt entirely automatically. No information is to be inserted by hand.

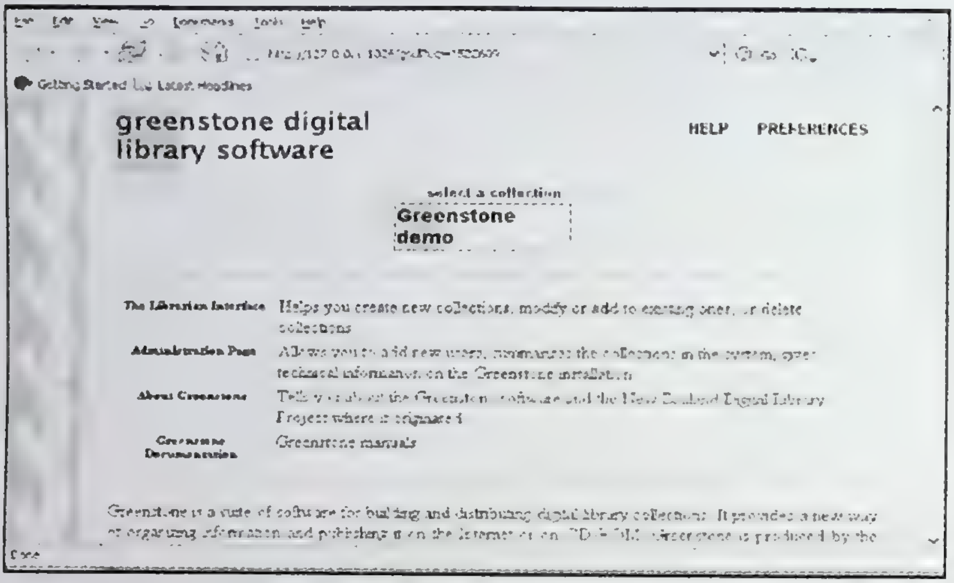


Fig. 13.5. Librarian Interface in Greenstone

Each document may be hierarchically organized into logical sections, each of which comprises paragraphs. Metadata such as author, title, date, keywords, may be associated with documents, or with individual sections. This is the raw material for indexes. It must either be provided explicitly, for example, in an accompanying spreadsheet or be derived automatically from the source documents. Metadata is stored with the document for internal use.

The software is organized so that "plugins" import documents and transform them into a standard XML form with metadata included. There are plugins for plain text documents; HTML, Word, PostScript and PDF files; email; and common bibliographic formats. New plugins can easily be written – several have been specially produced for proprietary formats. If the collection contains source documents in different forms, it is just a matter of specifying the necessary plugins. Plugins also perform metadata conversion, whether from internal sources such as HTML's

<title> and <meta> tags or Word's "summary" properties, or from externally - specified XML or spreadsheet files. Many collections express metadata in ad hoc ways – these require bespoke plugins. Some plugins also extract metadata from documents using text mining techniques. There are plugins that identify languages and extract acronyms, historical dates, email addresses, keyphrasres, etc.

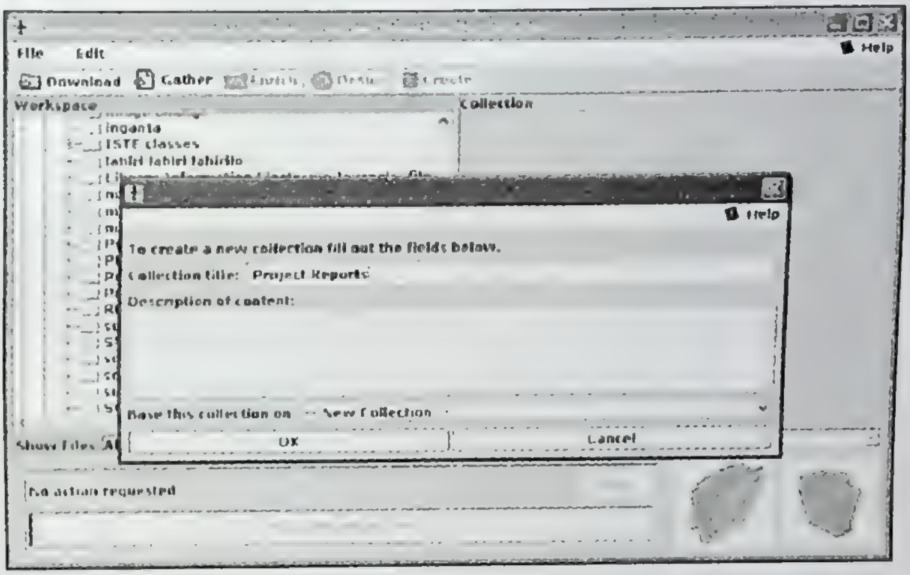


Fig. 13.6. Creating New collection in Greenstone

Modules called "classifiers" build browsing structures from metadata – alphabetic lists, dates, hierarchical classifications, etc. The Digital Library collection shown in the example above has four metadata indexes. One can access publications through a subject hierarchy using the subjects button; by title, which displays a list of books in alphabetic order; by organization (i.e., Dublin Core "publisher"); or by a list of hints defined by the collection's editors. Dublin Core forms a base that is extended to accommodate idiosyncratic requirements of collection designers.

The Unicode character set is used throughout, so documents – and interfaces – can be in any language. Collections have been produced in English, French, Spanish,

German, Maori, Chinese, Russian, and Arabic, and Greenstone has interfaces in all these languages. This also includes a text-only version for visually impaired users. Collections can contain text, pictures, audio and video clips, and music. Most non-textual material is linked to textual documents or accompanied by textual captions to support searching and browsing. Compression technology is used throughout to ensure best use of storage.

The system also includes an "administrative" function whereby specified users can examine the composition of all collections, protect documents so that they can only be accessed by registered users on presentation of a password, and so on. User activity logs record all queries made to every Greenstone collection.

Although primarily designed for web access, collections can be printed on self-installing Windows CD-ROMs with a built-in webserver and the same web interface. These operate standalone on all Windows versions – a requirement that complicates the software design but is crucial for users in underdeveloped countries seeking access to humanitarian aid collections.

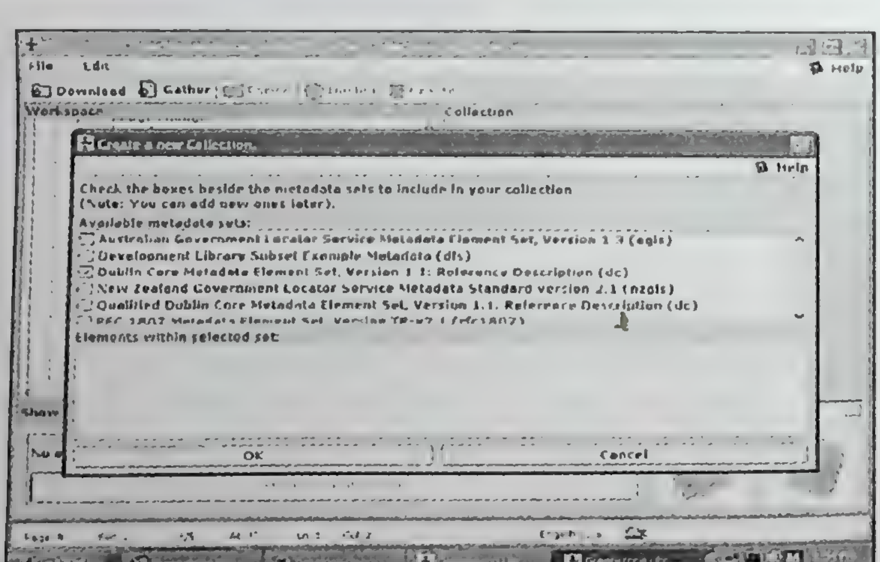


Fig. 13.7. Selection of Metadata in Greenstone

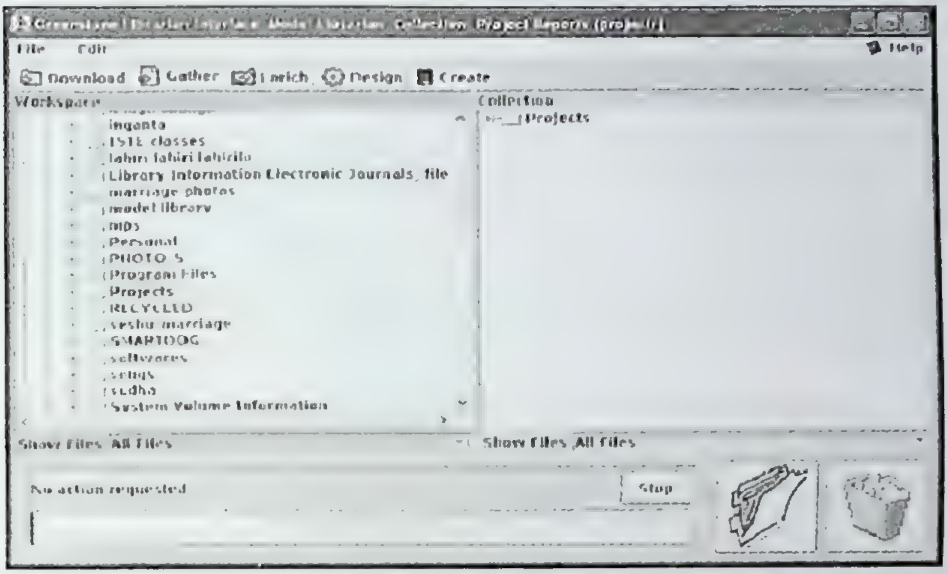


Fig. 13.8. Gathering area in Greenstone

Collection Building : The structure of each collection is determined at set up. This includes specifying the format of source documents, deciding how to display the documents on the screen, determining what the source of metadata will be, choosing what full-text searching and browsing facilities should be provided, and outlining how the search and browsing results should be displayed. Once a collection is in place, new documents in the same format can be added automatically.

The Greenstone "Collector" is an interactive subsystem for managing and accessing collections. The Collector can be used to:

- create a new collection with the same structure as an existing one;
- create a new collection with a different structure;
- add new material to an existing collection,
- modify the structure of an existing collection;
- delete a collection; and

– write an existing collection to a self-contained, self-installing Windows CD-ROM.

Imagine you are using the Collector to create a new collection from (let us say) a set of html files stored locally. First, an explanatory Web page appears asking you whether you want to work with an existing collection based on the first two options above; or build a new one based on the remaining options.

Either way you must log in before proceeding. Collections are built on a Greenstone server which is, in general, accessed remotely. Because arbitrary users cannot be allowed to build collections, access authorization is required. Thus a central library can, if desired, offer a service to people wishing to build information collections on it. Users who run Greenstone on their own computer may build collections locally, but must still log in to prevent arbitrary users of their library from building collections.

Dialog Structure : Upon completion of login, a new page appears that shows the sequence of steps involved in collection building:

– Collection information;

– Source data;

– Configuring the collection;

– Building the collection; and

– Viewing the collection.

The first step specifies the collection's name and associated information. The second step defines where the source data will come from. The third step tailors the configuration options, which requires considerable understanding of what is going on – this step is really for advanced users. In the fourth step all the work is done – the system makes all the indexes and gathers together all

information required to make the collection operate. Finally, the new collection can be viewed.

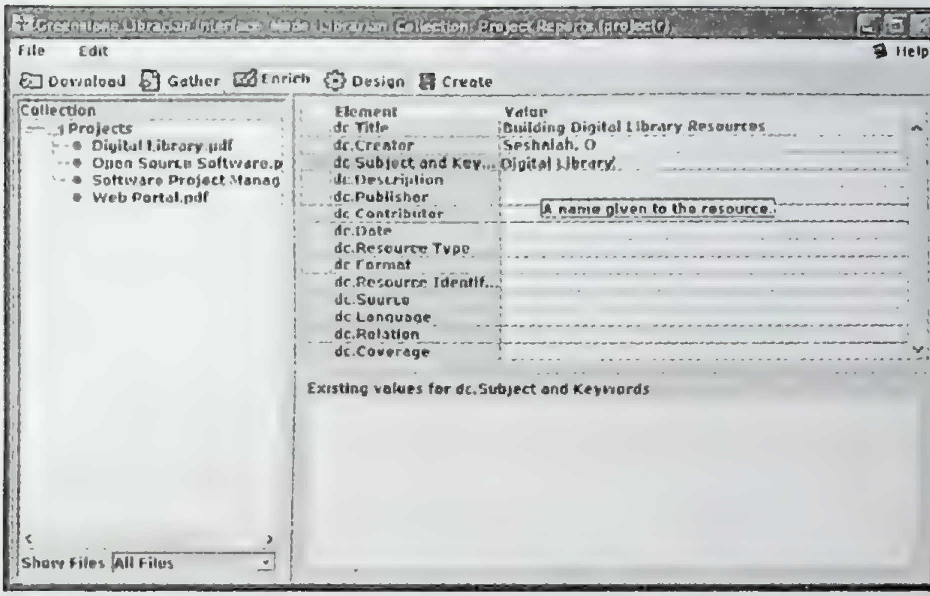


Fig. 13.9. Enriching in Greenstone

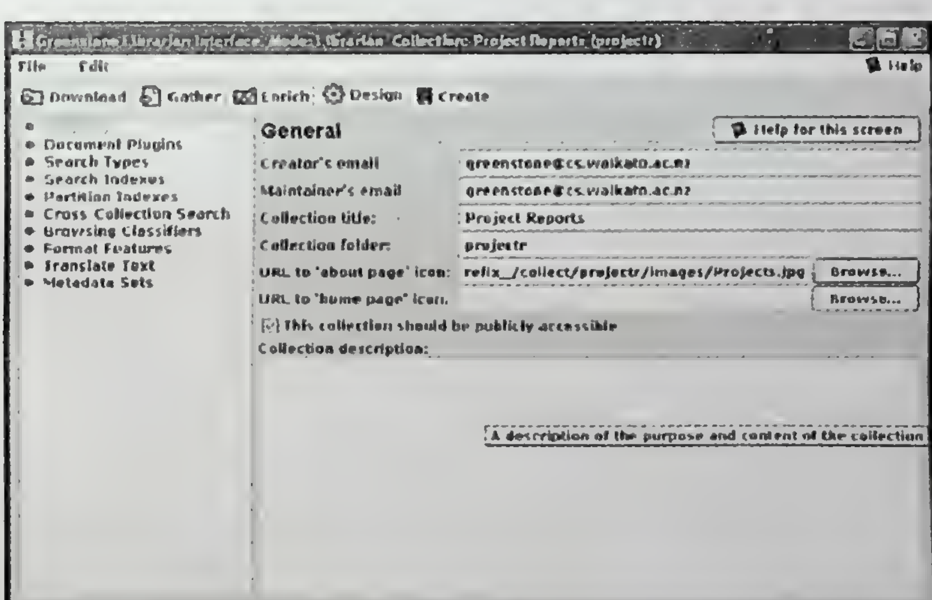


Fig. 13.10. Designing in Greenstone

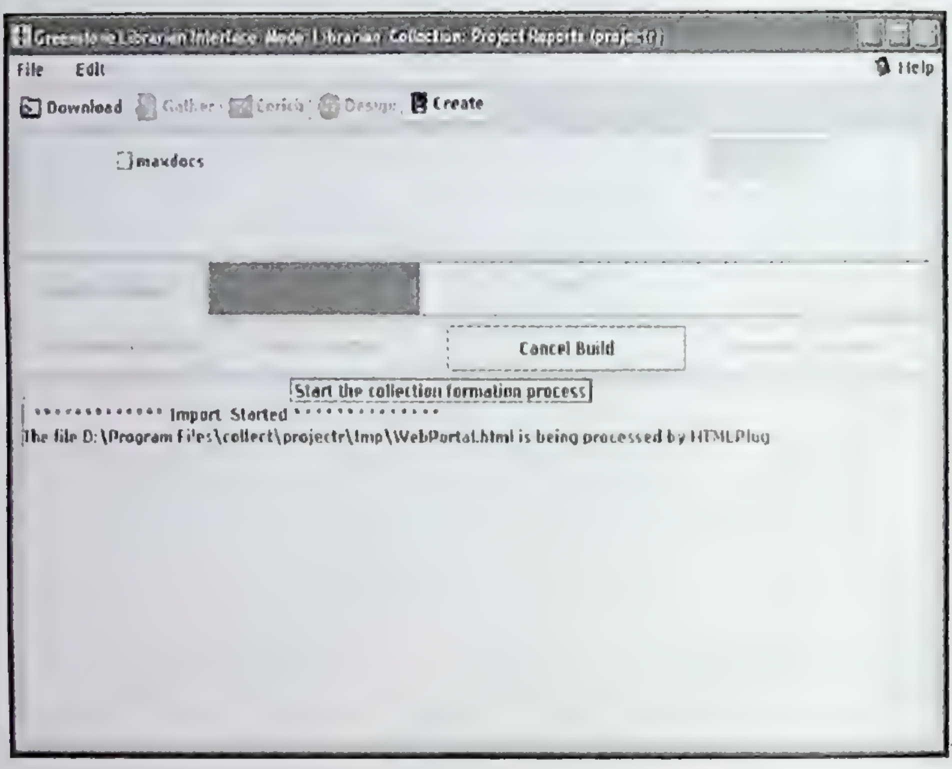


Fig. 13.11. Creating Collection in Greenstone

These steps appear as a linear sequence of buttons at the bottom of each Collector page so that users can keep track of where they are. Buttons change colour to reflect the current stage. The display is modeled after the "wizards" that are widely used to guide users through the installation of new commercial software.

Collection Information : The first step, collection information is to enter some information about the new collection. The title is a short phrase used to identify the collection. The email address is used for diagnostic reports in case any problems arise with the collection. The user also enters the text that appears under About this collection. An arrow appears at the bottom of the screen to indicate the user's position in the collection-building sequence – in this case the collection information stage. The user proceeds by clicking the green button, labeled source data.

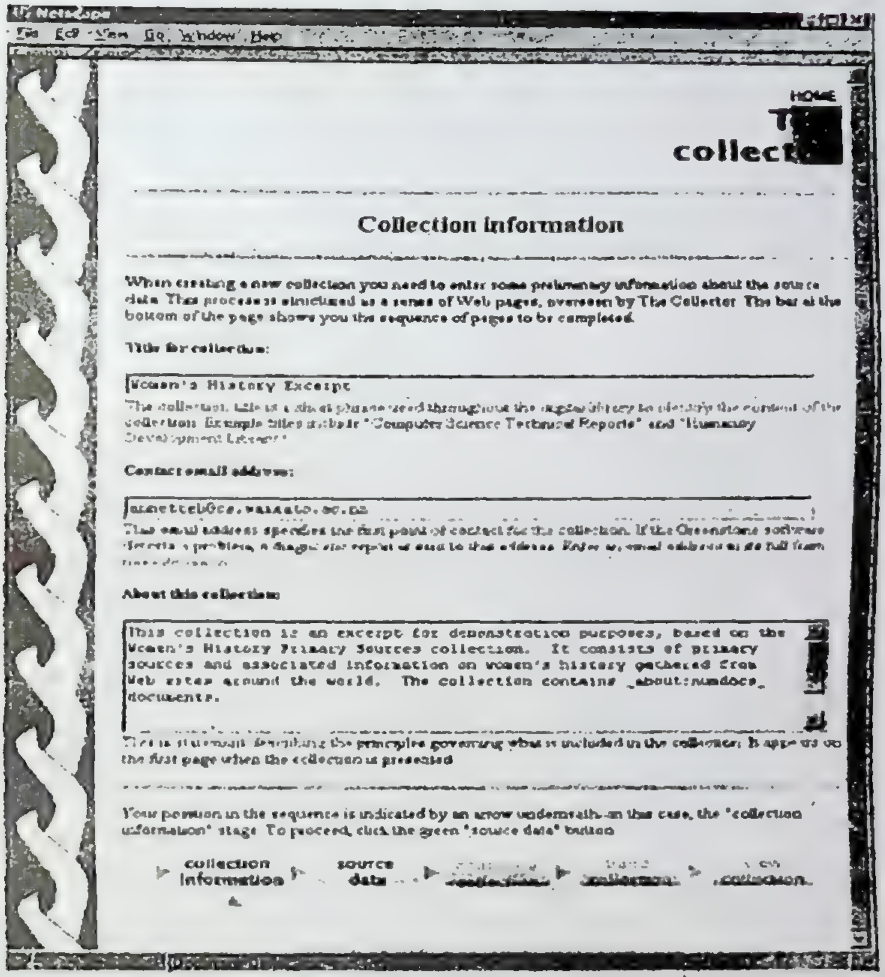


Fig. 13.12. First Step – A Typical Stage in using the Collector

Source Data : Next the user specifies the source text that comprises the collection. The collection is either completely new or a "clone" of an existing one. Creating a new collection with totally novel structure is a major undertaking, and most new collections are clones of existing ones. The user chooses which collection to clone from a pull-down menu. Most Greenstone installations have several different collections. The document file types in the new collection should be amongst those in the one being cloned, the same metadata should be available, and the metadata should be specified in the same way. However, Greenstone

is equipped with sensible defaults. If document files with an unexpected format are encountered, they are simply omitted from the collection. If the metadata needed for a particular browser is unavailable for a particular document, that document will be omitted from the browser.

When creating a completely new collection, a bland collection configuration file is provided that accepts most document types and generates a searchable index of the full text and a title browser since this metadata is normally available. Boxes are provided to indicate where the source documents are located. Any number of input sources can be specified. Specifications can be :

– a directory name on the Greenstone server system (beginning with "file://").

– an address beginning with "http://" for files to be downloaded from the Web.

– an address beginning with "ftp://" for files to be downloaded using FTP.

In each case of "file://" or "ftp://" the collection will include all files in the specified directory, any directories it contains, any files and directories they contain, and so on. If a filename is specified, that file alone is included. For "http://" the collection will mirror the specified Web site.

Configuring and Building the Collection : The construction and presentation of all collections is controlled by specifications in a configuration file. Advanced users may use the next page to alter the settings in this file. Most, however, will proceed directly to the final stage where the computer "builds" the new collection.

Up to this point, the responses to the dialog have merely been recorded in a temporary file. The building stage is where the action takes place. First, an internal name is chosen for

the collection, based on the title that has been supplied. Then a directory structure is created that includes subdirectories to receive, index and present the source documents. A recursive file system copy command is issued to retrieve source documents already on the file system; for offsite files a web mirroring package is used to copy the specified site along with any related Image files.

Next, the documents are converted into a standard XML form. Appropriate plugins to perform this operation must be specified in the collection configuration file. This done, the copied files are deleted – the collection can always be rebuilt from the information stored in the XML files.

Then the full-text searching indexes and browsing structures specified in the collection configuration file are created. Finally, the result of the building process is moved to the area for active collections. This precaution ensures that if a version of this collection already exists, it continues to be served right up until the new one is ready. The software assigns a global, persistent identifier to each document to ensure that the changeover is almost always invisible to users.

The building stage is potentially time-consuming. Small collections take a minute or so but large ones can take a day or more. The Web is not a supportive environment for lengthy activities. A button is provided that allows the user to stop the building process immediately, but users cannot be prevented from leaving the building page. If they do, the Collector continues regardless.

The progress is displayed in a status area at the bottom of the building screen, updated every few seconds. Warnings are issued if any of the following occur:

– non-existent input files or URLs are requested,

– there is no plugin that can process a file, or

– associated files – such as images embedded in html documents – are missing.

Users should monitor progress by keeping this window open in their browser. If any errors terminate the process, they appear here.

Viewing the Collection : When the collection is built and installed, a View collection button becomes active. Clicking this button takes the user directly to the newly built collection. Also, email is sent to the collection's contact email address and to the digital library administrator whenever a collection is created. This allows those responsible to monitor what is happening on the system.

Working with Existing Collections : Four additional facilities are provided when working with existing collections:

– adding new material,

– modifying the collection structure,

– deleting the collection, and

– printing it on a CD-ROM.

The same dialog structure is used to add new material to an existing collection, but entry is at the "source data" stage. New data is copied as before and converted to XML, joining any existing imported material. Revisions of old documents should perhaps replace existing ones rather than being treated as entirely new. However, this is so difficult to determine that all new documents are added to the collection unless they are textually identical to existing ones. While an imperfect process, in practice the browsing structures are sufficiently clear to make it easy to ignore near-duplicates. The aim of the Collector is to support the most common collection-building tasks in a straightforward manner. If greater control is necessary, it can be achieved by using a suite of

command-line scripts instead of the Collector interface.

The structure of existing collections is modified by editing their configuration file. Here, the dialog is entered at the "configuring the collection" stage.

To delete a collection, select it from a list and confirm its deletion. Only collections built by the Collector can actually be removed – others – typically built by advanced users working from the command line, are not shown in the list. It would be nice to be able to selectively delete material from a collection through the Collector, but this functionality does not yet exist. At present this must be done from the command line by inspecting the file system.

Finally, to write an existing collection to a CD-ROM, select the collection and it is automatically massaged into a disk image in a standard directory.

The Collection Configuration File : The information in Collection Configuration file was gathered from the user during the Collector dialog. The indexes line builds a single index comprising the text of all the documents. The classify line builds an alphabetic classifier of the title metadata.

A permissive list of plugins is included. ZIPPlug uncompresses any Zipped files, and makes them available to the other plugins. "GML" is the name of the internal XML document format, and GMLPlug processes previously imported documents. TEXTPlug, HTMLPlug and EMAILPlug process documents of the appropriate types, identified by their file extension. RecPlug expands subdirectories and pours their contents into the plugin list, thereby traversing arbitrary directory hierarchies.

```
creator         annetteb@cs.waikato.ac.nz
maintainer      annetteb@cs.waikato.ac.nz
public          true
beta            true

indexes         document:text
defaultindex    document:text

plugin          ZIPPlug
plugin          GMLPlug
plugin          TEXTPlug
plugin          HTMLPlug -file_is_url
plugin          EMAILPlug
plugin          ArcPlug
plugin          RecPlug


classify        AZList metadata=Title

collectionmeta collectionname    "Women's History Excerpt"
collectionmeta collectionextra   "This collection is an excerpt for demonstration purposes, based on the\
                                 Women's History Primary Sources collection. It consists of primary\
                                 sources and associated information on women's history gathered from\
                                 Web sites around the world. The collection contains _about numdocs_\
                                 documents"
collectionmeta .document:text    "documents"
```

Fig. 13.13. Configuration File for a Simple Collection

More indicative of Greenstone's power than the generic structure is the ease with which other facilities can be added. To choose just a few examples:

- A full-text, searchable index of titles could be added by augmenting the indexes line with one extra item.
- If authors' names were encoded in the Web pages using the html metaname construct, a corresponding index of authors could also be added by expanding the indexes line.
- With author metadata, an alphabetic author browser would require an additional classify line.
- Word and/or PDF documents could be included by specifying the appropriate plugins.
- Language metadata could be inferred by specifying an "extract-language" option to each plugin.
- With language metadata present, a separate index

could be built for document text in each language.

- Acronyms could be extracted from the text automatically and a list of acronyms added.
- Keyphrases could be extracted from each document and a keyphrase browser added.
- A phrase hierarchy could be extracted from the full text of the documents and made available for browsing.
- The format of any of these browsers, or of the documents themselves when they were displayed, or of the search results list, could all be altered by appropriate "format" statements.

To create indexes for section and sub-section, the pre-requisite is that the document should be in HTML format. Therefore, your collection files in other formats like PDF, Word, etc., are first to be converted into HTML format. Also in the Collection Configuration file (for GLI, in the Design Panel, in the Document Plugin section, while configuring the Arguments in the HTML Plugin, click and enable the 'description_tags'), the HTML plugin has to be modified to 'plugin HTMLPlug -description_tags'. Corresponding changes have to be made in the 'indexes' and the 'collectionmeta' lines. Obviously now the Source File has to be edited as a HTML file structure. For the section and sub sections, you need to edit the source file as follows, giving XML tags as comments in the body of the HTML file. Fig. 13.14 shows a hierarchy structured E-Book.

Skilled users may add any of these features to the collection by making a small change to the information presented during the "Configuring the collection" stage. However, it is anticipated that many casual users will operate at this level.

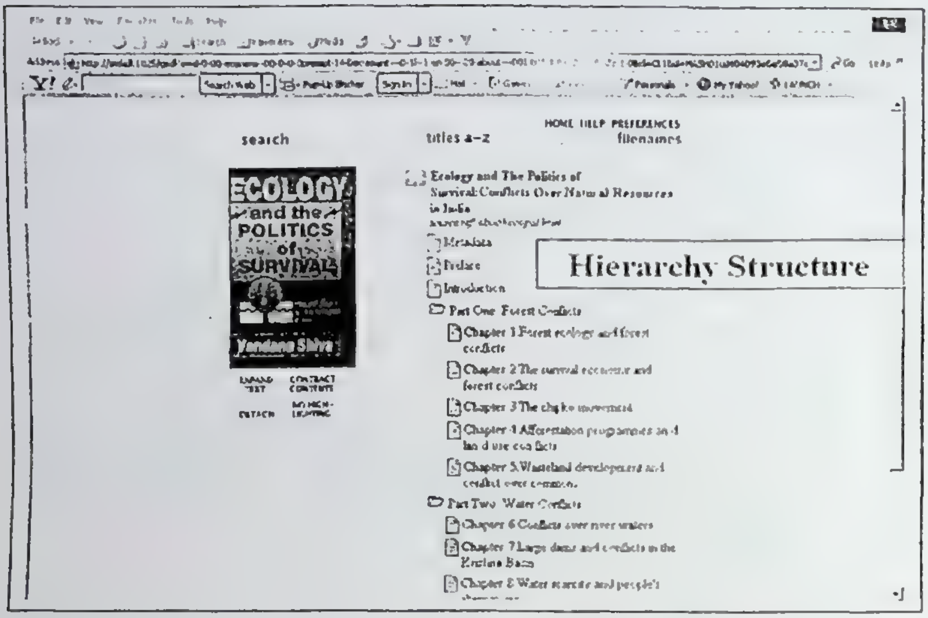


Fig. 13.14. An E-Book with the Hierarchy Structure

More likely, someone who wants to build new collections of a certain type will arrange for an expert to construct a prototype collection with the desired structure, and proceed to clone that into further collections with the same structure but different material.

Customization of User Interface (MyLibrary) : You need to work on the Collection Configuration (Collect.cfg) files in order to change the look and feel of the Greenstone user interface. Customising the User Interface requires a certain degree of knowledge on HTML and some level of Web Designing skills are prerequisites for this.

- *Collect.cfg*: This is the collection configuration file. You can find this file in the "Program Files\Greenstone2\collect\etc" directory. Details on how to create this file can be found in the Developer's Guide, "1.5 Collection configuration file" and "2.3 Formatting Greenstone output".

- *Macro files* : Macro files have an extension '.dm'. All macro files are stored in the "macros" directory.
- *Image files* : All images files can be found in the 'Program Fil.es\Greenstone2\images' directory.
- *Main.cfg* : This file contains a list of all macro files used for the User Interface. If you created a new '.dm' file, you need to add it to this file. The main.cfg file is stored in the "Program Files\Greenstone2\etc" directory.
- *Getting the Cover Image* : For you to get the Cover Image of your input document, you need to put the image file and the source file (document) into a single folder. They both should bear the same name also. While building the collection, Greenstone will take both the files to "Program Files\Greenstone2\collect\<collection name>\archives\Hash". The collection thus built will display the Cover Image along with the document. Also in the Design Panel, in the Document Plugin section, while configuring the Arguments for the HTML Plugin, give the custom argument as 'cover_image'.
- *Getting the Collection Icon* : Click on Design panel ->General Option -> URL to home page icon. Browse for image and locate it.
- *Getting Header Image for the Digital Library* : To get the header image which says MyLibrary banner in the DL head, create the graphic file (preferably a GIF file), name it as 'gsdlhead.xxx' and then replace it with the file available in 'Program Files\Greenstone2\images.'
- *Deep Level Customization* : By default, Greenstone's collection icon area is a matrix grid (the N × 3 format). You can change the collection icon area by editing the '_content_ macro' in 'home.dm'. You will need to

remove the '_homeextra_ macro' (this is the N × 3 table that the Greenstone C++ code automatically creates for you) and can then put whatever design customization you want into this area. You will need to put the icons and links to the collection yourself.

You can also achieve high end customization by replacing the 'home.dm' with 'yourhome.dm' in the/greenstone2\etc folder.

GSDL : Helpline, Archives : Greenstone's E-mail list is a very useful and active listserv which shares and clarifies user experiences and stories dealing with real life situations. To subscribe or unsubscribe to the list via the World Wide Web, visit "https://list.scms.waikato.ac.nz/ mailman/listinfo/greenstone-users" or, via email, send a message with subject or body 'help' to "greenstone-users-request@list.scms.waikato.ac.nz". Greenstone has started one more List recently, for the Greenstone 3 Version (the latest Beta version) user group, and the details are available at "https://list.scms.waikato. ac.nz/mailman/listinfo/greenstone3".

UNESCO has initiated a Greenstone support organization for South Asia in 2006, supported by a group of experts in the region, and it is coordinated by IIM Kozhikode http://greenstonesupport.iimk.ac.in. The site is rich with many of the Greenstone support materials. In addition, an E-list greenstonesupport@iimk.ac.in offers online support to professionals on Greenstone.

For those looking for quick solutions for their real-time or on-the-job trouble shooting while using the software, 'Greenstone Archives' is a treasure house. It is a database of the email messages circulated in the List, and is searchable. The mails generated from the List and its threads are archived and made available for the user community. The archive is available at "http://www.sadl.uleth.ca/nz/cgi-bin/

library?a=p&p=about&c=gsarch-e". This is the major list used worldwide for Greenstone and the content of the messages is usually global in nature. Developers and Greenstone users can avoid a great deal of unwanted labour by carefully going through the archive before they start working on problem solving, or before shooting a mail to the List.

To Sum up Greenstone have following features :

- It is widely accessible and the collections are accessed through a standard web browser.
- Its collections can be served on Windows and Unix, with an external Web server or (for Windows) a built-in one.
- It is *metadata-driven* where browsing (and, if desired, searching) indexes are built from metadata. Metadata may be associated with each document or with individual sections within documents. It must be provided explicitly – often in an accompanying XML or spreadsheet file or derivable automatically from the source documents.
- Its Plugins can be written to accommodate new document types. Classifiers can be written to create new kinds of browsing\indexes based on metadata.
- Unicode is used throughout and is converted on-the-fly to an encoding supported by the user's Web browser. Separate indexes can be built for different languages– a plugin allows automatic language identification for multilingual collections.
- Its interface is available in multiple languages and new ones are easy to add.
- Its collections containing millions of documents, and up to several gigabytes, have been built. Full-text searching is fast. Compression is used to reduce the

size of the indexes and text.

Besides the Z39.50 protocol is supported for accessing external servers and for presenting Greenstone collections to external clients.

Greenstone provides *flexible searching* where users can search the documents' full text, choosing between indexes built from different parts. Queries can be ranked or Boolean; terms can be stemmed or unstemmed, case-folded or not. Users can browse lists of authors, lists of titles, lists of dates, hierarchical classification structures, and so on. Different collections offer different browsing facilities, determined at build time. All structures are built directly from the documents them selves. New documents in the same format can be merged into the collection automatically. No links need be inserted by hand, but existing hypertext links in the original documents, leading both within and outside the collection, are preserved. So maintenance is almost zero. Standard classifiers can create phrase and keyphrase indexes of text – or indeed any metadata. And new collections can be installed without bringing the system down. Even active users rarely notice when a collection is updated.

Besides, Greenstone collections can contain pictures, music, audio and video clips. Currently, non-textual material is either linked in to documents or accompanied by written descriptions to allow access. However, the architecture allows plugins and classifiers to be written for generalized documents. Collections can be also published on a self-installing CD-ROM. A multi- disk solution has been implemented for larger collections. Its collections are served by different computers and can be presented to users as though they were part of the same library, through a flexible process structure. And last but not least, because Greenstone is open-source software, it can be easily modified!

Concluding at last it can be said that OSS gives library staff an option to be actively involved in development projects, and this involvement can take many forms, such as reporting bugs, suggesting enhancements, and testing new versions. Organizations adopting OSS will need to provide their staff with additional development and training to enable them to take on these new roles effectively, and will need to have a long-term commitment to the projects. Currently available open source projects cover application areas ranging from the traditional library management systems to innovations like Greenstone, DSpace and Ganesha, which complement traditional systems.

Systems librarians and library managers should watch this trend for future developments. The most important resource for the whole exercise is staff time and expertize. Although there is a lot of hi-tech and computers involved in creating and running a digital library, most of it is hard work. However, resources for emergencies need to be considered and contingency plans like-stand-by machine(s), and access to temporary staff, etc. need to be made.

14
Epilogue

Libraries are the storehouse of knowledge as they maintain the book and other knowledge resource available - mostly in printed form. However, with the advent of digital technology and Internet connectivity, the library scenario is changing fast. Digital technology, Internet connectivity and physical content can be dovetailed resulting in Digital Library. Data available in physical form can be preserved digitally in Digital Library. Digital Libraries have the ability to enhance access to information and knowledge. They also bridge barriers of time and space.

But technology changes so fast as Joseph Schumpeter, the Economist, saw capitalism moving in long waves– there can be seen changes every 50 years or so technological revolution that would cause "gales of creative destruction", in which old industries would be swept away and replaced by new ones. To illustrate,

1st long wave of harnessing steam power during 1780s to 1840s drove industrial revolution.

2nd long wave of harnessing Railway was during 1840s to 1890s.

3rd long wave of harnessing Electric power prevailed during 1890s to 1930s.

4th long wave of availability of cheap oil and automobiles during 1930s to 1980s.

5th wave of computing power with rapidly increasing performance-price ratio set in the Information Revolution in 1980s. If this was due to microprocessor, next technological revolution may based on nano-technology.

The societies, which participated in the process of knowledge generation, became advanced. Parity in sharing of knowledge is distancing the societies. The process of technology adoption by the society and thereby technological transformations are speeding up. Just 4 years after its inception, the World Wide Web had 50 million users. The number of Internet users now doubles every quarter. A quarter-century ago, it took a laboratory two months to sequence 150 nucleotides. Now, scientists can sequence 11 million nucleotides in a matter of hours. Cost of DNA sequencing has also dropped from US$ 100 per base pair in 1980 to less than a penny by 2005. Thus, the technology is advancing and cost is coming down.

ICT emerges as an enabling technology to improvise productivity and quality of life. Computers process digital information very fast, communication channels provide larger bandwidth to pass on vast amount of digital information very fast. Distances shrink. Globalization sets in. Time zones promote business collaborations aiming at 24x7 hours a week operation.

But the World is also digitally divided. As per IBM's Web fountain Analysis, 2003, it is seen that in compension to advanced nations, purchasing power parity (PPP), is around 10 percent for developing nations, and less than 1 percent for underdeveloped nations. For rapid penetration of ICT, PPP is key factor in evolving action plan during catch up phase of economic development. Affordable cost may be determined on this basis. For example $400 PC may be low cost PC in advanced nation, but it must cost less than $40 in developing

nations. Communication technology will soon be suitable. However, computer technology may pose some problems in input & output, representation & manipulation of information in non-Roman scripts.

The price and the language processing ability will determine ICT efficacy in a local situation.

Linguistic Divide on Internet is obvious with the following statistics: Latin Alphabet users have 39 percent of the global population, and enjoy 84 percent of access to the Internet. Hanzi-users (in CJK) have 22 percent of global population, and enjoy 13 percent of Internet access. Arabic script users have 9 percent of global population, and enjoy 1.2 percent of the Internet access. Brahmi-origin scripts users in South-east Asia and Indic scripts users occupy 22 percent of the world population whereas they have just 0.3 percent of Internet access. More than 65 percent of the content on Internet is in English. The scene is also depicted through following diagram.

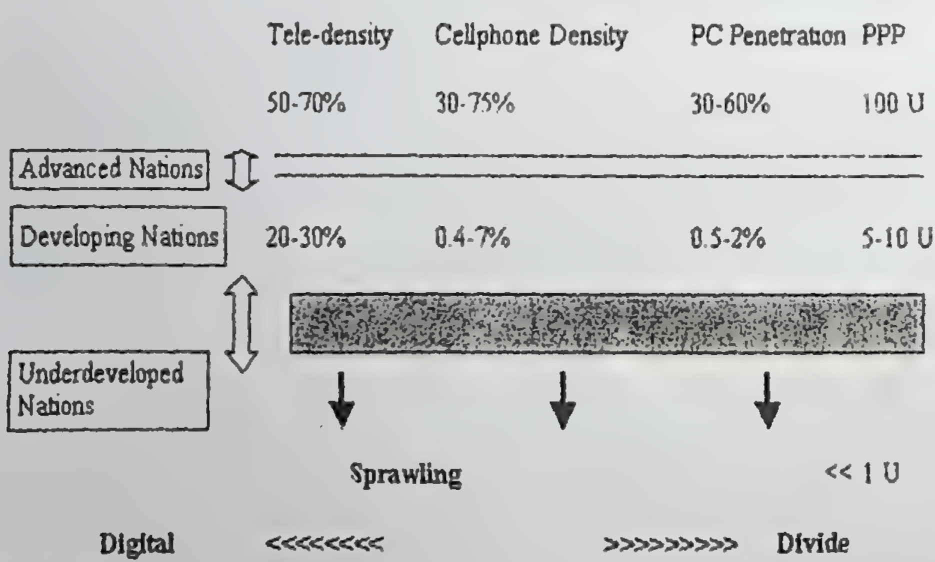


Fig. 14.1. PPP among World Nations

Table 14.1 depitcts the situation of digital divide among developed and developing nations.

Table 14.1. Digital Divide as they Behold

Perception	Developed Nations	Developing Nations
Why discussed?	Desire to capture larger markets	Fear of lagging behind in economic race
Policy	Information explosion	Localization
Results	Increasing use of English and of western culture	Erosion of local thrust languages and culture
Consumer nature	"substitute the old"	"Upgrade the Old"
Technology development	IPR-Centric	Open source technology
Low cost PC	\$400	less than \$ 40
Access cost	100 U	less than 10 U
Reason: PPP:(15:1)	34260 (USA)	2400 (India)
GNP:(75:1)	24260	460
Focus	Digital divide Access to information Wider control	Digital Unite Universalization of creativity Share the Knowledge clustering

Here, low affordability means low ICT penetration and sprawling Digital Divide.

Let all the communities the world over catch up to the *basic technology* absorption capability and use it for improving quality of life of the people at large. There is need to reverse the trend from *'being consumer'* into *'becoming creator'.* This necessitates to innovatively design ICT tools to facilitate creation and access to knowledge across geographic boundaries and linguistic barriers.

Further there is need for paradigm shift in our learning and teaching process. Learning has to be life long. Teacher acts as a facilitator, but also bears role of a Guru or mentor to teach wisdom - the encapsulated knowledge that holds good

across several context domains. Knowledge is contextual. Efforts are being made at UNESCO and country levels to promote international understanding and values education for peace, human rights, democracy and sustainable development.

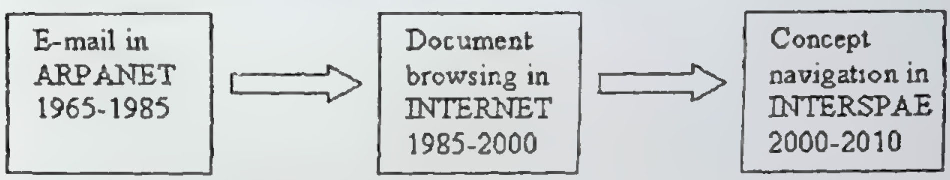
There is paradigm shift in computer processing. In the recent past, there was focus on 'data'; and R&D topics included databases and data processing. Currently focus is on "information", and R&D topics include Internet tools, content creation design of user-friendly systems at physical level. In the near future, focus will be on knowledge aiming at wisdom. Hence R&D topics may include knowledge manipulation and development of human inspiring system at cognitive level. With the convergence of computer, communication, consumer electronics and content technologies, Information Technology makes information available at any time, at any place, in any form and on any device. Multi-lingual multimedia technologies combine text, still pictures, moving pictures, sound animation and content in different languages. Internet brings such rich content accessible at every place. Storage, processing and retrieval of such rich content emerge as new topics for research and development. Like database management, new area of Content Management is growing.

Prof. Raj Reddy of Carnegie Mellon University predicts that after 10 years from now we shall be getting at the same cost the processing power 100 times, the storage 1000 times, and the band-width 10,000 times. ICT will be affordable, easy to use and pervasive. Ray Kurzweil, an Informatics Guru, predicts that within 10 years, a 1000-dollar computer will be able to perform more than one trillion calculations a second, that well within the first quarter of the 21st century, a similarly priced computer will match the human brain.

The Interspace represents the third wave in the ongoing

evolution of the Global Information Infrastructure, driven by rapid advances in computing and Communication Technology.

The technological progress of knowledge exchange - from e-mail in Arpanet (1965-1985) to Document browsing in the Internet (1985-2000) to Concept navigation in the forthcoming Interspace (2000-2010) - has occurred in three waves, each building on the previous one.



The convergence of computing and networking is more evident in the phenomenal growth of the World Wide Web. Gorden Moore, founder of Intel corporation postulated in 1965 that the microprocessor chip would double in performance every 18 months, that is 58 percent compounded annual growth rate. Historically, the semiconductor industry has kept pace by continuously shrinking feature size to increase the number of transistors on a chip, and thus increasing the speed of the circuits.

Beyond 2006, physical barriers ultimately include atomic properties that will come to fore with aggressive device shrinkage.

Table 14.2. Technology Roadmap for Semiconductors

Characteristic	1997	1999	2001	2006	2012
Process technology (nano meter)	250	180	150	100	50
No. of logic transistors (million) across chip	11	21	40	200	1,400
Clock speed (MHz)	750	1,200	1,400	2,000	3,000

Metcafe's law predict the power of a network of computer (p) as square of the number of connected computers (n) [p is proportional to n^2]. Gilder has predicted that the communication bandwidth will triple every year until 2020 AD. Network link throughputs are fast outstripping processor performance and memory capacities. There is increasing mismatch between fiber-optic transmission bandwidths and computer speeds, pushing computing further away from the network core. Whereas a high-end workstation today has a throughput of one gigabit per second, commercially available OC-192 Synchronous Optical Network (SONET) links operate at about 10 GIGAbit-per-second serial through put. Wave division multiplexing (WDM) optical systems can deliver aggregate throughputs of more than 200 GIGA-bits per second. Transmission bandwidth increased from 50 KBPS used by POTS (plain old telephone service) or ISDN (integrated services digital network) to 10 MBPS by Ethernet to 10 GBPS by OC-192 Sonet. As we move toward the ultrafast, fibre-optic systems found in network backbones, computing is increasingly relegated to the peripheries of the network. On the one hand, the Web's popularity and growth has been fueled largely by desktop applications consuming bandwidth intensive images and videos. On the other hand, thin-client computers are becoming more commonly used as edge-of-network devices, often connected by wireless technology.

There is increasingly shift from Operating System to processor to network to storage. Storage is increasingly strategic to businesses. Information centric computing include operations such as Find, Create, Store, Retrieve, Manage. Data are more valuable than processing. Internet provides new challenges for storage– A4 data accesses (Anywhere, Anytime, Anyone, Any device); 24×7×365 hours uptime dynamic scalability; lower costs, independence from legacy systems. Areal density on magnetic hard disk drives have

advanced 2 million times since the first disk drive by IBM in 1957. DVD (Digital Video/ Versatile disc) can store up to 17 billion bytes of data on 4.75 inch platter. Areal density for DVD-type products is targeted to 50 GB/ in^2 for multimedia applications. This may further be pushed to exceed 100 Gb/ in^2 using e-beam lithography micro-fabrication techniques. Optical storage techniques are reported to provide terra bits/ in^2 areal density. Current storage media can be classified into 3 classes – magnetic, optic and solid state. A relatively new approach to information management known as the SAN (Storage Area Network) provides high-speed any-to-any interconnection of servers and storage elements. Solid-state storage technology is approaching the density and cost of magnetic mass storage. FLASH memory is now replacing hard disks in some applications.

This overall changes also affected the library shape and services. Up to the 1960s libraries and information services the world over were not very much influenced by any kind of information technology tools. Publications were available in plenty, still within manageable limits. Prices were affordable and every library had enough money to acquire at least all the essential items. Recorded knowledge was mostly available in printed form and no gadgets were required to use them. From book collection to library architecture the science of libraries was perfectly developed. The main preoccupation of the library profession was perfecting cataloguing and classification systems. But this situation did not last long. Computers entered the library field right from the beginning of the 1960s.

And with the development of Internet facility and WWW, Digital Libraries (DL) are now emerging as a crucial component of global information infrastructure, adopting the latest information and communication technology.

14.1. DIGITAL LIBRARY INITIATIVES

At the global level, digital library initiatives can be said to be started from USA. It seems that six major projects were launched during 1994-1998 under DLI (Digital Library Initiative) funded by the NSF, DARPA and NASA in the USA. Digital Libraries Initiative-phase 2 (DLI-2) is an NSF led initiative that builds on the successes of DLI-1. DLI-2 is supported by many funding agencies like NSF, DARPA, National Library of Medicine, Library of Congress and National Endowment for the Humanities. DLI-2 will investigate digital libraries as human-centered systems.

JSTOR project started at University of Michigan with the grant of the Andrew W Mellon Foundation. JSTOR database total more than 450,000 articles and 2.7 million pages created via a combination of page images and full-text scanned-in files, the database is growing at a rate of 100,000 pages per month. JSTOR serves more than 350 academic institutions around the world. The JSTOR (Journal Storage) project was intended to become a commercial service. They choose the mature technology of digitized bitmaps (page images) rather than the immature technology of SGML markup. The www.jstor.org URL links to three server machines: two at University of Michigan, a third at Princeton University. Distributed mirrors offer increased reliability, accessibility, and capacity. The round robin feature of DNS (Domain Name Service) provides a single Web service from multiple locations.

The Infomedia Project at Carnegie Mellon University has created a terabyte digital video library in which automatically derived descriptors for the video are used for indexing, segmenting, and accessing the library contents. Artificial Intelligence techniques have been used to create metadata - the data that describes video content. But powerful browsing capabilities are essential in a multimedia information

retrieval system because the underlying speech, image and language processing are imperfect and produce ambiguous incomplete metadata. The Carnegie Mellon DLI project searched multimedia, particularly video segments, by generating text indexes using speech understanding. The Stanford DLI project searched across different engines using multi-protocol gateways. Other even harder issues remain untouched, such as multicultural search across context and meaning.

The importance of D-Lib research is also spreading beyond the US. European research in Digital Libraries is funded by the European Union as well as national sources. DL projects have supported by the Information Engineering, (www.echo.lu/ie), Language Engineering (www.echo.lu/langeng/en/lehome.html), and Esprit (www.cordis.lu/esprit) programs in Europe. Under NSF-EU collaboration, five working groups has been formed in the key technical areas of Interoperability, Metadata, IPR, Resource indexing and discovery, and multilingual information access.

Since 1995, D-Lib research has become a national grand challenge in several countries in Asia. Its most projects can be classified into the following categories:

- Nationwide D-Lib initiative and special purpose digital libraries-for example, the library 2000 Project in Singapore and Financial Digital Library at the University of Hong Kong to serve the needs of HK stock market and users.
- Digital museum and historical document digitalization-fox example, Digital Museum Project of the National Taiwan University and Digitalization of art collection of the Palace Museum in Taipai by IBM.
- Local language and multilingual information retrieval-for example, the Net Compass Project of Tsinghua

University in China, Chinese Information Retrieval at the Academia Sinica, Taiwan, and New Zealand's multilingual project.

Local language processing and historical cultural content could be the most immediate Asian contribution to the international DL community. An Asia Digital Library consortium is fostering long-term collaboration and projects in DL-related topics in Asia (www.cyberlib.net/adl).

The New Zealand D-Lib (http://www.nzdl.org) currently offers about 20 collections, varying in size from a few documents upto 10 million documents and several gigabytes of text. The documents written in many different languages, including English, French, German, Arabic, Maori, Portugese and Swahili. The D-Lib provides interfaces to the collections in several languages. To accommodate blind users (with speech synthesizers) and partially sighted users (with large-font displays), NZ D-Lib provides text only version of the interface for each language. The design is based on collections-set of like documents. The documents come in a variety of formats– plain ASCII, Post Script, PDF, HTML, SGML and Microsoft Word for textual documents. Collections invariably undergo a building process to make them suitable for search, retrieval, and display.

Managing the complexity of multiple collection, multiple languages, and multiple interface options presents a significant challenge. For example, document items that have not yet been translated to other languages need to default to English, Non-ASCII languages like Arabic and Chinese need special text positioning and justification.

In India Digital Library projects were initiated by the Department of Scientific & Industrial Research (DSIR), the Department of Information Technology (DIT) and the Department of Culture (DoC). DSIR funded project on Digital Library of Traditional Heritage knowledge; DIT launched

Digital Library of India initiative; Department of Culture support DL activities at Indira Gandhi National Center for Arts. It has launched a comprehensive National Mission for Digital Libraries that synergizes with other mission such as National Mission for Intangible Cultural Heritage (ICH) and National Mission on Manuscripts.

Currently the concept 'Digital Library' is being practiced by and large loosely or even confused by many information systems. However, during the past five years, India has seen several Digital Library initiatives at the institutional, organizational and at national levels. Some of them are quite successful while others are making significant progress. Some of the major initiatives on Digital Libraries in India are furnished below:

- 'Archives of Indian Labour' at the V.V. Giri Institute of Labour (http://www.indialabourarchives.org/sources/jnu.htm)
- Indian Institute of Science NCSI (http://vidya-mapak.ncsi.iisc.ernet.in/cgi-bin/library)
- Indian Institute of Management Kozhikode (http://intranet.iimk.ac.in/cgi-bin/library)
- Search Digital Library SDL at DRTC Bangalore (http://drtc.isibang.ac.in/index.jsp)
- Nalanda Digital library, National Institute of Technology (NIT) Calicut (http://www.nalanda.nitc.ac.in)
- Vidyanidhi Project (http://www.vidyanidhi.org.in)
- National Tuberculosis Institute (NTI), Bangalore (http://ntiindia.kar.nic.in/)
- Rajiv Gandhi University of Health Sciences, Karnataka (RGUHS) (http://www.rguhs.ac.in/dl/index.html)
- Traditional Knowledge Digital Library (TKDL) - (http://

203.200.90.6/tkdl/langdefault/common/home.asp)

- Indian School of Business (http://www.isb.edu/lrc/index.html)
- Indian Institute of Technology, Kharagpur (http://www.library.iitkgp.ernet.in/usr/elib/digital.htm)
- Indian Institute of Technology, Mumbai (http://www.library.iitb.ac.in/~mnj/gsdl/cgi-bin/library)
- IITMK, Trivandrum (http://www.iiitmk.ac.in/iiitmk/digitallibrary.htm)
- National Chemical Laboratory (NCL, CSIR) - Digital Repository - (http://dspace.ncl.res.in)

Some other important projects are presented in table 14.3.

14.2. BARRIERS TO DIGITAL LIBRARY INITIATIVES

But inspite of above developments, there are umpteen number of problems the Digital Library development teams face in India while they embark on the digital library development as well as during the progress phase. Some of the prominent and predominant among them include the following :

1. Lack of Proper Information & Communication Technology Infrastructure : Digital Libraries demand cutting edge IT and Communication infrastructure such as:

- High end and powerful Servers; Structured LAN with Broadband Intranet facilities, ideally optical fibre based Gigabit networks;
- Required number of Workstations capable of providing online information services, computing and multimedia applications;

– Internet connectivity with sufficient bandwidth, capable of meeting the informational and computational requirement of the user community;

There are many more related facilities / services which are highly essential in an ideal digital library environment. It is observed that the ICT infrastructure in most of the Institutions / Organizations, barring exceptions, are not up to the desired level so as to run advanced digital library services to the optimum level.

2. Lack of Proper Planning and Integration of Information Resources : Presently the library acquisitions in India are either paper based and electronic. In most of the libraries, paper based documents outnumber the electronic subscriptions and acquisitions. Some of the libraries need retro-conversion and digitization of library holdings too. Literature on related studies show that there is a severe lapse on the libraries with regard to proper planning of their information resources which are conducive for developing digital libraries. Also, the electronic resources penetrate to the libraries in a multiplicity of complex formats and with different access terms and conditions. These information resources are scattered and distributed across a wide variety of publication types and a vast number of publishers. There is a dire need for proper planning and a meticulously framed content integration model which is achieved and implemented through world standard digital library technologies.

3. Rigidity in the Publisher Policies and Data Formats: Having successfully installed and configured a digital library does not qualify a library to automatically populate all its digital collection into the digital library. One has to obtain publisher's consent and copyright permissions for the same. Digital library softwares usually accept and process all popular and standard digital formats such as HTML, Word, RTF, PPT, or PDF. Most of the publishers put their materials in their own proprietary

Table 14.3. Important Digital Library Projects in India

Sl. No.	Name of Project and Implementing Agency	Objectives and Deliverables of the Project	Project/ Achievements
1.	Establishment of Digital Library of India by ERNET India	• Make Collaborative arrangement between institutions in India and US to digitize around a million books • Contain different types of content both of technical literature and art • Facilitate easy access and optimize the bandwidth – both domestic and International • Set up servers at 13 nodal centers and Link the nodal centers on the ERNET India's backbone for making available digital books accessible for anyone on the net.	Installed servers at 13 Nodal centers. Provided the connectivity to 6 nodal centers i.e. internet bandwidth of 2 Mbps to SERC, IISc., Banglore, IIIT, Hyderabad, I Mbps to IIIT, Allahabad, 512 Kbps to C-DAC, Noida & Rashtrapati Bhawan and 128 Kbps to Sri Jagadguru Shankracharya. Sarada Peetham, Sringeri.
2.	Setting up of scanning centers in Uttar Pradesh for participation in the Million Book Universal Digital Library Project of Carnegie Mellon University of USA by IIT Allahabad	• To digitize books of common interest to the communities and make them available in a location and time independent way.	The scanned data are web enabled, on http://www.new.dli.ernet.in/

3.	Setting up of scanning centers in Maharastra for participation in the Million Book Universal Digital Library Project, by MIDC, Mumbai	• Conversion of rare books of common interest in digital form and make it available on the web	The scanned data being web enabled
4.	Setting up of scanning centers at Hyderabad for participation in Million Book Universal Digital Library Project by Central Library Hyderabad and State Central Library Hyderabad	• Conversion of rare books of common interest in Telugu and Sanskrit in digital form and make it available oh the web	The scanned data are web enabled on http://www.new.dli.ernet.in/
5.	Advaita Sharada Project (Digitization of ancient manuscripts other & south Indian Languagas pertaining to the vedas, vedangas, upanishad and other sastric studies by Sri Sri Jagadguru Shankaracharya Mahasamsthanam Dakshinamanga Sri Sharada Peetham, Sringeri	• Digitization of ancient manuscripts	The scanned data are web enabled on http://www.new.dli.ernet.in/
6.	Digital Archiving for preservation of rare manuscripts and old magazines from mid 19th century to 1960 available with Nagri	• Digital Archiving for preservation of rare manuscripts and old magazines from mid 19th century to 1950 available with 'Nagri Pracharini Sabha, Varanasi.	The scanned data are web enabled on http://www.dli.cdacnoida.in/

	Pracharni Sabha, Varanasi by C-DAC Noida		
7.	"KALASAMPVA" Digital Library - Resource of Indian Cultural Heritage (DL-RICH)- by IGNCA; New Delhi	• To enhance the access to cultural resources using digital technology. Digital resources made accessible to the students, scholars, researchers and scientific community	The scanned data are web enabled on www.ignca.gov.in/dlrich welcome.html
8.	Digital Archiving for Preservation of Rare Manuscripts and Folios available with Namgyal Institute of Tibetology - Sikkim by Namgyal Institute of Tibetology - Sikkim with technical support of C-DAC Kolkata	• Digital Archiving for preservation of rare manuscripts and folios available with Namgyal Institute of Tibetology, Sikkim. • Digitization of Hymns reactions	Project is ongoing
9.	Setting up of scanning centre at Sringeri, Karnataka for participation in Million Book Universal Digital Library project of Carnegie Melon University of USA by Sringeri, Math Sringeri, Karnataka	• Heritage Collection & Digitization/ OCR of Palm Leaf Manuscripts, Kaditas, Paper Manuscripts and printed books on Vedas • Voice & Video recording of Shastrartha deliberations, Transcriptions of vedic, Sanskrit Manuscripts and Books Development of indexing using self learning mechanism of DB2 content manager for manuscripts	Scanned books are web enabled on http://www.new.dli.ernet.in/

10.	Setting up of scanning centre at Goa for participation in Million Book Universal Digital Library Project of Carnegie Melon University of USA by University of Goa	• Digitization/OCR of rare books in Portuguese, Marathi and Konkani in the Digital forms and make them available to public and also on the web	Project is ongoing
11.	Setting up of scanning centre at Hyderabad, for participation in Million Book Universal Digital Library Project of Carnegie Melon University of USA by University of Hyderabad	• Digitization/OCR of rare books in Telgu, Sanskrit, Hindi and English & Indian History, etc	Project is ongoing
12.	Setting up of scanning centre at Bharatiya Jnanpitha for participation in Million Book Universal Digital Library Project of Carnegie Melon University of USA by Bharatiya Janan peeth, Lodhi Road, New Delhi	• Digitization/OCR of rare books and manuscripts etc. of Jain Heritage culture in the digital forms and make them available to public and also on the web	The scanned data are web enabled on http://www.new.dli.ernet.in/
13.	Setting up of scanning centres in Maharastra for participation in the Million Book Universal Digital Library Project by University of Pune	• Conversion of rare books of common interest in Marathi and Sanskrit in digital form and make it available on the web	The scanned data are web enabled on http://www.new.dli.ernet.in/

14.	Print your own book -Mobile Digital Library by C-DAC Noida	• Mobile Digital Library is to bring million digitized books • Expanding access to Information and Knowledge in schools, library and hospitals etc. • Updating digital library with available contents	Books are scanned, printed and distributed in schools
15.	Creation of Digital Library of Books in President House by C-DAC Noida	• To create a free-to-read, searchable collection of data in the form of images in the first phase and then conversion of data into text format in English and Indian languages by scanning the books and indexing the images through keywords.	Digital library is created in President House. The scanned data are web enabled on http://www.new.dli.ernet.in/
16.	Establishing centers for Digital Archiving and creation of rare knowledge pertaining to Ayurvedic Medicine, integrating & show casing of the content created through Digital Library outlet for Uttarakhand State Govt. by C-DAC Noida	• Digitize Manuscripts & Information related to Ayurvedic and Forestry	The scanned data are web enabled on http://www.dli.cdacnoida.in/

e-book reader formats, from which the text extraction becomes almost impossible. A vast majority of the scholarly content rests in journal literature and due to copyright issues they cannot be easily find its way into the local repositories of the digital library.

4. Lack of ICT Strategies and Policies : A vast majority of the libraries in India do not have laid down policies on ICT panning and strategies to meet the challenges posed by the technology push, the information overload, as well as the demand pull from the users.

5. Lack of Technical Skills : The human resources available in the libraries need time-to-time professional enrichment inputs and rigorous training on the latest technologies which are playing around in the new information environment. The kind of training programmes being imparted in India at the moment are not able to meet the demand in terms of quantity as well as quality.

6. Management Support : For the provision of world class information systems, resources and services the libraries need the wholehearted support from the respective management. Institutional support in terms of proper funding, human resources and IT skills enrichment are prerequisites for the development and maintenance of state-of-art digital library systems and services.

7. Copyright / IPR Issues : The issues of copyright, intellectual property, and fair use concerns are posing unprecedented array of problems to the libraries and librarians are struggling to cope with all these related issues in the new digital information environment.

But as librarians, we have to face a number of challenges that should keep us gathering information and learning continuously. Foremost among those is a changing user base. The user base is more diverse in every way

possible – culture, educational background, requirements, etc. Our user base, whether we work in traditional or nontraditional settings, wants information more quickly; exactly the information they need, with nothing extra; and convenient access–24 hours a day, 7 days a week, 365 days a year. Other challenges include the following:

- Continued movement away from hard-copy resources and toward electronic resources.
- Increasing numbers of resources.
- Exponential increases in the amount of data and information available.
- Competition from the Internet, megabookstores, and other information- delivery vehicles.
- New technologies providing wider access to various content formats.
- Librarians or so called information professionals are moving away from traditional librarianship.
- Ensuring our own future employability.

The last two challenges are major reasons for staying on top of your game. You want to have employment options. The proceeding on a successful career path is predicated on continued learning and application of that knowledge. Continuing education and training will help you meet the other challenges. The more you know, the better your response to challenges will be.

14.3. LATEST DEVELOPMENT

The world wide web was initially created to solve was document management. Berners-Lee was employed by CERN in the 1980s to devise a system that would allow the organization to keep track of all versions of all the documents

that its employees were creating, editing and exchanging constantly. This is the same problem that Engelbart was dealing with 20 years earlier with NLS and Bush 50 years earlier with the Memex.

The world wide web has many of the features of a digital library, and if the web did not exist our conception of digital libraries would be very different. The web is undoubtedly the means via which most digital libraries are accessed. It is not a managed environment, it has no collection development principles and most significant of all, the digital objects are not perceived as having durable value - though many of them do. Indeed, one of the issues being tackled in the digital library world is the vexing one of how to guarantee a record of the information available on the web for future generations. Much of the web is ephemeral information– advertising, personal web pages, announcements, etc.,

Reference services, sometimes referred to as "reference and information services", refer to the personal assistance provided to users in the pursuit of information. The provision of such personalised information services has remained the central theme of the library and information profession. These can be effectively provided through web.

14.3.1. Reference and Information Services on the Web

A number of reference and information services are now available on the Web. Interestingly, many of these services are provided by non-library and commercial organizations. While some are free, others need payment. McKiernan maintains a site that provides categorized listing of libraries that offer real-time reference services using chat software, live interactive communication tools, call centre management software, bulletin board services and other Internet technologies. Most of these services are designed for registered users of the libraries concerned.

Chowdhury and Chowdhury categorized online reference and information services into three broad groups:

- Reference and information services from publishers, database search services, and specialized institutions;
- Reference services provided by libraries and/or experts through the Internet; and
- Reference and information services where users need to conduct a search and find information through the Web.

They have further discussed several online information services that belong to the first category mentioned above. They have listed various current awareness and SDI services such as:

- The contents page service from commercial publishers, such as Elsevier's Contents Direct Service, IDEAL Alert from Academic Press, and so on;
- Information on new books available free from publishers and vendors, such as the *Wiley Book Notification Service* and Amazon.com;
- SDI services from online search service providers, such as Dialog *{Dialog Alerts); and*
- *Current Contents* and *ISI Alerting Services* from ISI, and so on.

Some of these services, particularly the contents page services from publishers of journals, are free, while for others, such as *Dialog Alerts* or *Current Contents* from ISI, users need to register and pay.

Table 14.4 provides a quick overview of some online reference and information services currently available. This is not an exhaustive list, but the table shows the different types of services and some of their characteristics. It provides

the following facts about the Web-based reference services listed there:

- the listed Web-based reference services are offered by dotcom companies;
- these services use the Web only for communication between the user and the system/answer provider, while the information service is provided by a human expert;
- while most services are free, some charge as high as $250 per question;
- in many cases services are provided by volunteer experts; and
- there are some services offered in specific subject fields.

In addition to those in Table 14.4, there are also some Web-based reference services where users need to conduct a search for a reference query. Such services provide free access to various online reference sources, and allow users either to select a specific source or conduct a search on a range, or all, of the reference sources. Examples of such services include the following:

- Internet Public Library (http://www.ipl.org).
- Infoplease (http:www.infoplease.com).
- Britannica (http://www.britannica.com).
- Bartleby Reference (http:www.bartleby.com/reference).
- Internet Library for Librarians (http://www.itcompany.com/inforetriever/).
- Electric Library (http://ask.elibrary.com/refdesk.asp).
- Mediaeater Reference Desk (http://www.mediaeater.com/easy-access/ ref.html).
- ReferenceDesk (http://www.referencedesk.org/).

- Xrefer (http://www.xrefer.com/).

While most of these Web-based reference services are available free, some charge a small fee. For example, the Electric Library charges $79.95 for an entire year of unlimited access.

A study by Janes *et al.* of 20 Web-based "expert services" reveals that by asking 240 questions to 20 selected expert services, they noted that the sites gave verifiable answers to 69 per cent of factual questions. An interesting observation of this study was that the kind of reference interview that takes place in traditional reference service environments is non-existent in Web-based reference services. In fact, the sites did not come back for any discussion or clarification after receiving the initial queries. As a justification, the authors suggested that Web-based information services have been built mainly to answer factual questions, and therefore the experts concerned do not need to go through the reference interview process. Nevertheless, the high rate of success of factual questions shows that more and more end-users will move towards these expert services rather than to libraries for answers to simple types of questions.

Although Ask Jeeves is basically a search engine, many researchers also see it as a Web-based information service because of two reasons:

- Unlike in other search and metasearch engines, users can ask a question in Ask Jeeves, and in many cases can get an answer right away; and
- Users can ask a question on a given topic, and Ask Jeeves comes up with a list of questions on the same or similar topics; the user can select any of the those predefined questions, and then Ask Jeeves provides answers to that.

Table 14.4. Some Digital Reference Services

Service	Subject	Payment	Organisation	Service providers	Question input	Mode of delivery
Askme	All	Free	Askme.com	Experts (volunteers)	Select a subcategory and input query through a Web-based query form	E-mail
All Experts	All	Free	Allexperts.com	Experts (volunteers)	Select a subcategory and input query through a Web-based query form	E-mail
Inforocket	All	Fee-based	Inforocketcom	Experts (volunteers)	Select a subcategory and input query through a Web-based query form	E-mail
AskAuntie Nolo	Law	Free	Nolo.com	Subject experts	Input query through a Web-based query form	E-mail
Find/SVP	Business	Fee-based	Findsvp.com	Business experts	Input query through a Web-based query form	E-mail, phone, fax, courier
Professional City	Law, accounting, marketing	Fee-based	Professional City.com	Cybrarians	Input query through a Web-based query form	E-mail

This is an interesting service and may be considered as a useful model for digital library reference and information services. The Ask Jeeves site (http:// www.AskJeeves.co.uk) maintains that: Ask Jeeves is a unique question-answering system that allows users to ask questions in plain English, and then delivers the answer. As one of the most sophisticated navigation systems on the Internet, Ask Jeeves combines a unique natural language engine with a proprietary knowledgebase. Taken together, this mechanism processes the meaning and grammar of real questions in plain English; provides intelligent responses for user confirmation; links directly to relevant, high-quality answers; and, perhaps most exciting of all, becomes more intelligent as its knowledgebase expands with each question asked and each answer delivered.

The site further says that Ask Jeeves processes each query syntactically – to analyse the grammar, and semantically – to determine meaning, and then Ask Jeeves' answer-processing engine provides the question template response. When the user clicks on a response, the answer-processing engine retrieves the answer template that contains links to the answer locations. Thus, Ask Jeeves helps users select a query from a pre-defined set of queries on a given topic. However, there is a debate on whether the kind of service provided by Ask Jeeves matches reference services provided by libraries. Kresh reported an interesting finding: "One consortial system in northern California conducted an informal test of Ask Jeeves by sending it 12 questions its libraries had answered. There were no trick questions, none were arcane, just questions typically received by those libraries. Jeeves was unable to answer any of the questions". Nevertheless, the techniques and the technology used by Ask Jeeves may be very useful for introducing reference services in digital libraries.

Webhelp.com (http://www.webhelp.com) is another service that claims to offer "real-time search assistance with a real live expert I any time, day or night". About.com (http://www.about.com) is a service that shows a number of pre-defined categories related to a search topic given by the user. For example, a simple search on "e-commerce" not only produces a list of sites, but also provides a set of topics related to "e-commerce", such as e-commerce definition, e-commerce security, advantages of e-commerce, e-commerce disadvantages, e-commerce statistics, etc.

14.3.2. Digital Reference Services and Libraries

A number of libraries have now begun to offer Web-based reference services and a number of recent studies report the current practice of reference services provided by libraries. Although this is not an exhaustive review of all the Web-based reference services provided by libraries, the following section provides a quick overview of some that are currently available.

Digital Reference Services for the General Public : Ask A Librarian is a Web-based reference service, primarily designed for UK residents, provided by a network of public libraries in the UK. The site says: "Mail us your factual question and we will send you an answer within two working days, if not before". A user has to put the query through an enquiry page, which is automatically routed to one of the participating libraries, which receives it as an e-mail message. Within two days the library sends an e-mail message to the user with its response to the enquiry.

The British Library provides special reference services for business, patent, scientific, technical, medical and environmental information. These services range from answering simple questions to finding answers to complex questions involving online database searching, etc. While

some of these services are free, for others users need to pay. For example, users can ask simple business questions using a form, and can expect an answer within ten working days. Similarly, users can send e-mails with simple environmental queries. A typical answer in such a case may include:

- A list of bibliographies from a British Library catalogue literature search; and/or;
- A list of organisations to contact for more detailed information, and/or
- Information retrieved from Internet sources.

Users are not charged for this kind of service. However, for complex queries users need to pay. For example, the British Library provides a Science Technology Medicine (STM) search service for which users need to pay. As stated in the Web site, most searches take at least 30 minutes and therefore cost $ 41.00 for staff time + costs for online searching + VAT. The site also mentions that the average list of references costs $80.00 for medical subjects, and between $ 100.00 and $ 150.00 for other subjects. Users are also charged a fee if the results are to be faxed. In order to obtain an STM search service, the user has to fill in a form that has three parts. In the first part users need to fill in their personal details, etc.; in the second part, users need to enter the query, and in the third part they need to specify the modes of delivery, payment, etc. In the second part of the form, users can enter the detail specification of the query using Boolean operators and specifying date, language, etc., as limiting factors.

Digital Reference Services for Users of Academic Libraries : Academic libraries have also begun to offer Web-based reference services. Wasik and Wasik & Lankes described how Ask A services are built and maintained, and also explain how the service works in the classroom. Archer

and Cast emphasized the importance of the personal touch in reference services and discussed how Web technology and the personal element of reference services can be combined to provide Web-based reference services. Tenopir and Tenopir & Ennis reported a survey of the current practices of digital library services in 70 academic libraries in the USA.

These studies noted that the university libraries allow their patrons to pose reference questions in a variety of ways– 99 per cent offer e-mail reference, 96 per cent offer reference services by appointment, and 29 per cent of the libraries offer real-time virtual reference. Breeding briefly described the various customer relationship management (CRM) software, such as eGain (http://www.egain.com), LivePerson (http://www.liveperson.com) and WebLine (http://www.webline.com/products/web.htm), that are used by libraries for providing Web-based reference services. He also suggested that while the CRM software offer a great deal of sophistication to the virtual reference environment, they are more complex and expensive compared to lower-cost chat-based utilities that allow a managed two-way text conversation between the reference provider and the remote library user, thus replacing the need for a face-to-face communication.

Smith discussed the current technologies, such as chat and videoconferencing software used by libraries for providing digital reference services. Richardson *et al.* examined the information technology aspects and the key organizational issues involved in establishing an electronic reference desk service in a library. They also reviewed the usefulness of some electronic reference services. Breeding provided an overview of some methodologies and collaborations currently in use to extend assistance to patrons in learning to use virtual resources and in finding the information they need.

Digital Library Service by Co-operative Library Systems: In order to deal with the rising cost of reference

sources and staff and also of the huge initial investment required for introducing new services in libraries, many have gone for a co-operative model of digital reference services. Oder and Weissman described the 24/7 Reference Project at Metropolitan Cooperative Library System, a consortia around Los Angeles, and the Bay Area Libraries Project at San Francisco that are co-operative projects for providing Web-based reference services to customers.

One of the advantages of Web-based reference services is that users can ask for such services from a remote location at any time of the day. However, Rogers presented an interesting report of a study analysing Web-based reference services in academic libraries in Illinois. This study shows a usage pattern that is quite similar to the timing of usage of traditional reference services in libraries.

14.4. RSS FEEDS

RSS, the Rich Site Summary or RDF Site Summary or Really Simple Syndicating is a format for delivering regularly changing web content. Many news-related sites, weblogs and other online publishers syndicate their content as RSS Feed to whoever wants it. It is a lightweight XML format designed for sharing headlines and other Web content. We can think of it as a distributable "What's New" for our site. Originated by UserLand in 1997 and subsequently used by Netscape to fill channels for Net center, RSS has evolved into a popular means of sharing content between sites – including the BBC, CNET, CNN, Disney, Forbes, Motley Fool, Wired, Red Herring, Salon, Slashdot, ZDNet, and more. RSS solves myriad problems webmasters commonly face, such as increasing traffic, and gathering and distributing news. RSS can also be the basis for additional content distribution services.

There are two ways to manage RSS– one is to use a

feedreader, which is fine to only one or two blogs. The next version of IE6 will enable RSS feeds on the desk top. This would enable the library to keep the databases up to date more easily.. The other way is to use an aggregator to manage feeds such as: RSSFeeds.com (at : http://www.rssfeeds.com) Syndic8 (at : http://www.syndic8.com), NewsIsFree (at : http://www.newsisfree.com), Lisfeeds.com (at : http://www.lisfeeds.com); the latest is relevant to libraries.

RSS is becoming the preferred way people receive and read the news Instead of seeing a whole article, you view just a headline and a summary, which allows you to quickly scan the information and then click through to the source Web site to read the entire article of only specific items you want. Expanding beyond the original idea of really simple syndication for Web sites, RSS is now a delivery method for fee-based information as well as free, is no longer restricted to a simple feed, and can be based on keywords.

14.4.1 Advantages of RSS

These can be listed as under:

- RSS solves a problem for users who regularly use the web. It allows them to easily stay informed by retrieving the latest content from the sites they are interested in.
- Users can save time by not visiting each site individually. They may ensure their privacy, by not joining each site's email newsletter.
- When subscribing to a feed, users do not disclose their email address, so users are not increasing their exposure to threats associated with email– spam, viruses, phishing, and identity theft.
- If users want to stop receiving news, they do not have to send an "unsubscribe" request; rather users can simply remove the feed from their aggregator.

- The feed items are automatically "sorted" in the sense that each feed URL has its own sets of entries. It is unlike an email box, where all mails are in one big pile and email programs have to resort to complicated rules and pattern matching.

14.4.2 RSS in Libraries

The potential of RSS feeds for the library environment is at least as great as its multiplicity of uses in other contexts presently suggest. Libraries publish announcements for their target audiences much as other web publishers might - notices, activity bulletins and the like – but libraries also want to present information on local and online (library) resources. While service announcements can be made by e-mail or on a library web page, we can use RSS feeds for such service announcements and, at the same time, offer live hyperlinks to online resources. It is not necessary to give up the old and familiar ways used until now; nor is it even necessary to make significant changes to the core of library web sites. Users utilizing RSS feeds will be very happy to be able to read their library related news at/with their aggregators. Here are listed some RSS utilizations in libraries that can be of immense importance.

RSS Marketing Ideas : RSS feeds can be used to publish any announcement from the library weblog on activities, exhibitions, promotions and new library resources, especially databases. Librarians could introduce new resources with a short blog note and users could share their experiences, creating an interchange of questions and answers about the resources. Libraries establish consortia to achieve better value in making large purchases. Similarly, library consortia could enable member libraries to work together to provide more detailed information about their 'products' and services to RSS aggregators. And, of course, library webmasters could aggregate this information to their

respective library web sites for the benefit of their more immediate or local user group.

RSS Book Lists : Perhaps the most practical potential usage of RSS feeds in library settings is in the easy generation of various kinds of book lists. As patrons are always curious to know about what's new, a "New Items" list could be attempted. For large libraries, it would be impossible, of course – the hundreds or even thousands of books added every month. But for smaller libraries and perhaps for each branch or section of larger libraries a RSS feed showing new items available. Another list could be created for the library's most wanted books. This list could even be named "Most Reserved Items" because new patrons would likely reach these items only through use of reservation services. That would serve to hype what the library has in terms of product– the desired items that everyone wants, and services – patron's ability to reserve desiderata. This kind of list could be produced and published using data from the library's integrated library system at daily, weekly, biweekly, monthly or other desired intervals.

RSS Table of Contents : Current awareness services such as Table of Contents compilation were traditionally manual and mainly slow. Web services have speed up the process and reduced library staff labour, improving efficiency. Will librarians and other service providers want to, or even be able to, make use of additional metadata included within RSS feeds? We do not know, but still we are optimistic that third-party services can be built on top of rich data payloads. At NPG Librarians are also experimenting with providing an Open URL interface into our growing RSS archive, which is essentially a repository of bibliographic metadata.

Due to their popurarity the number of sites offering RSS feeds is growing rapidly and includes big names like Yahoo News. Thus, in Library and Information Centres where today

saving the time of the user is one of the important factors this news handling technology through RSS feeds is an important information dissemination tool if utilized efficiently and can be one of the important information services.

14.5. WEB 2.0 AND LIBRARY 2.0

Web 2.0 is the business revolution in the computer industry caused by the move to the Internet as platform, and an attempt to understand the rules for success on that new platform. In simple words it can be said that web 2.0 hints at an improved form of the World Wide Web. The idea of "Web 2.0" can also relate to a transition of some websites from isolated information sites to interlinked computing platforms that function like locally-available software in the perception of the user. Web 2.0 also includes a social element where users generate and distribute content, often with freedom to share and re-use. This can allegedly result in a rise in the economic value of the web as users can do more online and will add to the intellectual content of the sites helping Library & Information Centres or LIC's to aid to the R&D activities going on in the parent institution. Moreover it can be said that Web 2.0 is a knowledge-oriented environment where human interactions generate content that is published, managed and used through network applications in a service-oriented architecture, i.e., an LIC.

Tim O'Reilly attempted to define the concepts behind Web 2.0, and offered a useful diagram (Fig. 14.2) to illustrate some of the related ideas. Shortly after releasing the paper, Tim posted a shorter definition of Web 2.0 on one of his company's blogs :

'Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the

more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of Web 1.0 to deliver rich user experiences.'

There is undoubtedly a significant degree of hype around Web 2.0 at the moment, but behind the hyperbole lie some important principles, and some powerful potential.

We are seeing the emergence of Web-based services that pull data from a wide range of back-end systems to deliver value to users, when, where and in the form that they require it. We are seeing *ad hoc* relationships being formed by and for these services at the point of need, rather than the costly and time-consuming human creation of contracts or service level agreements. We are seeing disaggregation of content and services into components that are far more meaningful to the user and potentially far more valuable to the provider, alongside disintermediation of the Gate Keepers in favour of direct access to Web-visible resources. We are seeing previously passive recipients of content beginning to engage, and to combine and recombine that which they are given in new and interesting ways. We are seeing the realization of much of the Interoperability promise, with expensive monolithic systems increasingly likely to be replaced by a platform supporting purpose-specific components.

14.5.1. Paul's Principles of Web 2.0

Web 2.0 presages a freeing of data, allowing it to be exposed, discovered and manipulated in a variety of ways distinct from the purpose of the application originally used to gain access. There is no need for some new Web 2.0 *technology* in order for material that was previously locked away to be made public. Some of the work at

backstage.bbc.co.uk is relevant here, and the BBC is to be commended for taking the brave step that it did in opening up access to a growing body of their content and Web-based back room applications. Legislation such as that around Freedom of Information and Public Sector Information (PSI) echoes this broader trend, with an increasing presumption that access is a right rather than a grudgingly granted privilege.

Web 2.0 permits the building of virtual applications, drawing data and functionality from a number of different sources as appropriate. These applications tend to be small, they tend to be relatively rapid to deploy, and they bring power that was previously the preserve of corporations within the reach of suitably motivated individuals. Richard Wallis' work with Google Maps, some of which is exposed in a proof of concept known internally as LibMap is one example of the way in which data (from the Silkworm Directory) and functionality (courtesy of Google Maps' API) can build new applications beyond the reach of either on their own.

Web 2.0 is participative. The traditional Web has tended to be somewhat one-sided, with a flow of content from provider to viewer. The figures suggested that 44 percent of Internet-using American adults had actively participated online, by blogging, sharing files, or equivalent. Although unlikely to approach 100 percent any time soon, that percentage will rise, and participation will become a more pervasive aspect of our online lives as we share reviews of books, comment on the local Chinese restaurant, engage with our governments, or publish our own carefully crafted research into our family tree. Web 2.0 applications have been quick to spot the value of user-generated content. It is useful to facilitate participation in the way a messaging service might, but it is a lot more valuable to fold the output of that participation back into the application and make it available to all of the applications users.

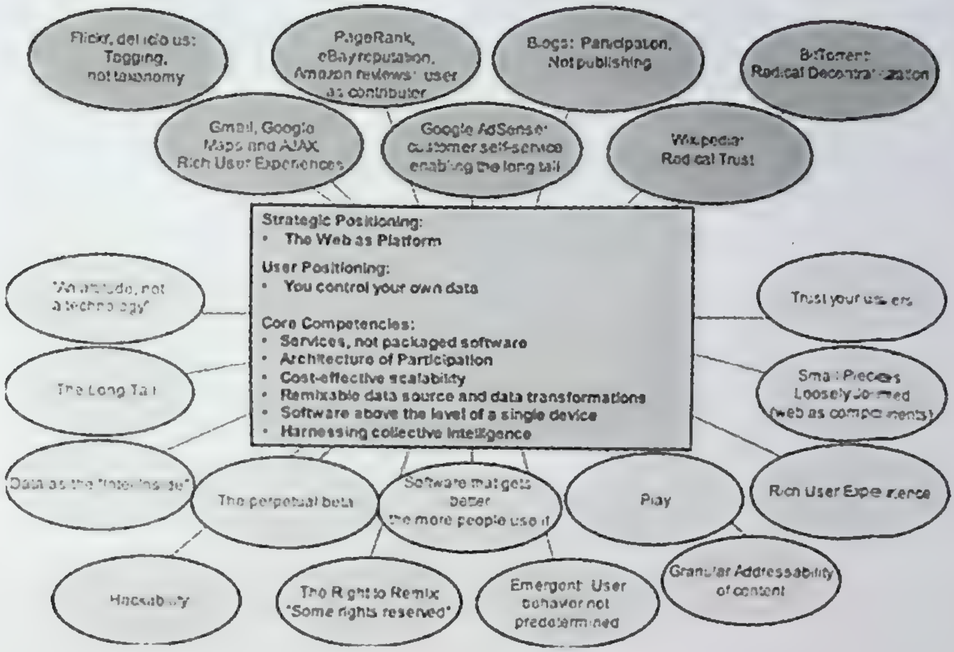


Fig. 14.2. Tim O'Reilly's Web 2.0 'meme map'

Web 2.0 applications work for the user, and are able to locate and assemble content that meets *our* needs as users, rather than forcing us to conform to the paths laid out for us by content owners or their intermediaries.

Web 2.0 applications are modular, with developers and users able to pick and choose from a set of interoperating components in order to build something that meets their needs. Not only that but the Web 2.0 applications themselves become components for building yet more applications. The units of composition are becoming more powerful and hence more valuable.

Web 2.0 is about sharing – code, content, ideas. That does not mean there is not money to be made. There is, but new business models need to be found whereby we collaborate on the platforms and make money by adding value over and above that which we and others have built together.

Web 2.0 is about communication and facilitating

community. People communicate. The Web facilitated that to a degree, but presented a barrier that hindered the back-and-forth of true communication. Trackbacks and the like are a shaky step towards Tim Berners-Lee's original vision of the Web as a two-way environment which made it as easy to contribute as it did to view.

Web 2.0 is about **remix**. For too long, we have jumped from one area of the Web to another, struggling with different interfaces, ignoring endless advertisements, and wading through uninteresting content on a site in order to locate the service, document, or snippet that meets our needs. Increasingly, we can unambiguously reference and call upon the service, document or snippet that we require, incorporating it into something new that is both ours and the original contributors.

Web 2.0 is **smart**. Applications will be able to use knowledge of us, where we have been and what we are doing to deliver services that meet our needs. Amazon's recommendation engines are only the beginning, and there is more work to be done allaying fears of intrusion and loss of privacy. Amazon has data, libraries have data. *Everyone* has data. There is real potential to do some compelling things with it, provided that appropriate safeguards are developed and implemented.

Web 2.0 opens up **the Long Tail**, making it increasingly cost-effective to service the interests of large numbers of relatively small groups of individuals, and to enable them to benefit from key pieces of the platform while fulfilling their own needs.

Web 2.0 is built upon Trust, whether that be trust placed in individuals, in assertions, or in the uses and reuses of data.

14.5.2. Web 2.0 + Library = Library 2.0?

Library 2.0 is simply the uses and applications of web

2.0. So, Library 2.0, in its most practical and focused expression, is about using new web technologies to connect and establish relationships with patrons. Web 2.0 is a term coined to describe the emerging Internet technologies. Hence the birth of the phrase "Library 2.0" to describe use of these new web applications within library systems. Library 2.0 is variously defined as under.

According to Wikipedia, "Library 2.0 is a model for library service that reflects a transition within the library world in the way that services are delivered to library users. This redirection will be especially evident in electronic offerings such as OPAC configuration, online library services, and an increased flow of information from the user back to the library. The concept of Library 2.0 borrows from that of Web 2.0, and follows some of the same philosophies underpinning that concept. Proponents of this concept expect that ultimately the Library 2.0 model for service will replace outdated, one-directional service offerings that have characterized libraries for centuries."

To Michael Casey, "Library 2.0 sees the reality of our current user-base and says, "not good enough, we can reach more people." It seeks to do this through a three-part approach–reaching out to new users, inviting customer participation, and relying on constant change. Much of this is made possible thanks to new technologies, but the services will only be partially tech-based.

Further he says, "Library 2.0 is, to me, a service philosophy built upon three things; a willingness to change and try new things; a willingness to constantly re-evaluate our service offerings; and finally, a willingness to look outside our own world for solutions be they technology-driven or not."

To Casey Bisson, "Library 2.0 is not about technology. Library 2.0 seeks to harvest good ideas from outside and use them to deliver improved and new services, often times

in an effort to reach a new target population. Library 2.0 is, at its core, a way of thinking, a way of operating. It is a framework for integrating change into all levels of library operations. It is in our effort to reach this new level of service that we will utilize these new, often times Web 2.0, technologies."

Jessamyn West says, "The whole 2.0 thing in general seems to be about using the hive mind and the affordances of technology to synthesize newer, better and more useful systems that then become available for everyone."

To Meredith Farkas, "The idea of Library 2.0 represents a significant paradigm shift in the way we view library services. It is about a seamless user experience, where usability, interoperability, and flexibility of library systems is key. It is about the library being more present in the community through programming, community building (both online and physical), and outreach via technology (IM, screencasting, blogs, wikis, etc.). It is about allowing user participation through writing reviews and tagging in the catalogue and making their voice heard through blogs and wikis. It is about making the library more transparent through its Web presence and its physical design. We need to make the library human, ubiquitous, and user-centered. This involves a change in our systems, our Web presence, and our very attitudes. It will take a lot of work for a library to be completely 2.0, but the idea should inform every decision made at the library."

Sarah Honghton is of the opinion that "Library 2.0 simply means making your library's space (virtual and physical) more interactive, collaborative, and driven by community needs. Examples of where to start include blogs, gaming nights for teens, and collaborative photo sites. The basic drive is to get people back into the library by making the library relevant to what they want and need in their daily lives...to make the library a destination and not an afterthought."

Below are given some voices of different scientists as mentoned in *Cites & Insights – mid winter 2006* issue with some modifications.

Aaron Schmidt at *walking paper,* does not use the term "Library 2.0" directly. The post is about social software and its potential for libraries, offering some good reasons to consider them: They are fun, cheap and easy; "Internal utility" (the tools can be useful for library staff; "leadership" (promoting the library's web presence and instructing users); and "reputation"–the reputation of libraries in general.

Angel at *The gypsy librarian,* finds himself "caught in the middle" in a December 6, 2005 post and a December 7 followup. He notes Meredith Farkas' discussion and takes a different tack:

"I do not think the whole issue is so much that the Web 2.0 advocates do not defend the concept. I think they actually defend it very well. In fact, they do so a bit too well. That may be part of the problem. At times, the advocates seem to say you are with us or against us. They say you should be doing X or Y and wonder why the rest of us do not see it as self-evident. The ones who think it is hype only seem to get their suspicions that it is all hype confirmed. The nature of the conversation has been confrontational from the start. I am sure the 2.0 advocates did not intend it that way, but by taking an attitude of "this is best, here is why, and you will fall behind if you do not adopt (or adapt)," it just makes others question and say "oh, really?"

Angel has mixed feelings–but is concerned by "the attitude of join us or be square." He discusses the difference between hot ideas and working them out. He notes that we rarely hear about failures and that advocates have not convinced or educated others very well. While he is all for collaboration, better service and access, and openness, "I do not assume...every library has to have every new 2.0 toy

or gadget. What may work for you may not work for me." Angel labels himself as Generation X. He is *not* an old fogey waiting to retire. He sees the need for "a true conversation" and wants to see more bridges.

The followup provides more insights on the impact of labeling and the difficulty of finding a middle way on confrontational issues.

Bill Drew at *Baby boomer librarian says on* one interesting aspect of "Library 2.0" is that its most prime movers have been the *public* librarians. Drew is convinced that Morrisville "encourages the heart" and does well on "the library is human" and "recognizes that its users are human too." The kicker comes in the final paragraph. Many of the ideas considered part of Library 2.0 have actually been part of best practices for libraries for many years. The new technology just gives us new tools to do more and to do better. For Drew, most of the principles are not new. In that sense, "Library 2.0" is truly all technology.

Brian Smith at *Laughing Librarian says*: Did not Library 2.0 really happen decades ago, when libraries started buying the books that people wanted to read, in addition to "books that are good for you"? As far as he can tell, that's what the Library 2.0 boils down to: being user-driven, saving the user's time. Not exactly new ideas.

"Library 2.0" is just a faddish catchphrase. Ignore it, because it will be gone in 6 months. The only things labeled "2.0" with which library folks need to be concerned are pencils. And maybe RSS feeds. Smith is not dissing the concepts—just the bandwagon and the "newness."

Casey Bisson at *Maison Bisson says,* "Library 2.0 is not about software, it is about libraries. It is about the evolution of all of our services to meet the needs of our users." After some discussion of photography and painting, Bisson comes to this conclusion:

We have two choices. We can continue to operate by the old rules and hope that we find wealthy patrons to support us as symbols of the wealth and refinement of our communities. But, if we look hard, we will find that we can apply the core values of librarianship to current technologies and new service models, and rather than becoming a sort of art, we will be valued for serving the needs of our communities.

If anyone objects to word "confrontational" to describe some Library 2.0 advocates, Bisson appears to say libraries operating by "the old rules" are nothing more than "symbols of the wealth and refinement of our communities"–only Library 2.0 will allow libraries to serve community needs. That presumably means the entire community. He seems to suppose that *everybody* uses web-based tools for all information interactions and does not consider checking out books and media, storytelling, reference or other current services "serve the needs of our communities." It is found that astonishing and unsupportable, it flies in the face of all those communities that pass tax overrides and bond issues to build physical libraries and book collections, even though most of the librarians involved do not promise that all will become Library 2.0.

Since, in a later post, Bisson dismisses qualms about the term "Library 2.0" with a simple "So what," maybe I just do not understand the subtlety of his declaration that libraries do not serve their communities with existing services.

Charles W. Bailey, Jr. at *DigitalKoans* in Blogs, tagging, Wikis, tells oh my! Whether "Library 2.0" truly transforms libraries" Web presence or not, one thing is certain: the participative aspect of 2.0 represents a fundamental, significant change.

Why? Because we can ask patrons to be become content creators, not just content consumers. And they will be interacting with each other, not just with the library. This

will require what some have called "radical trust," meaning who knows what they will do or say, but the rich rewards of collective effort outweigh the risks.

Or so the theory goes. Recent Wikipedia troubles suggest that all is not peaches and cream in Web 2.0 land. But, no one can deny that participative systems can have enormous utility far beyond what one would have thought. Bugaboos, such as intellectual property violations, libel, and fiction presented as fact, of course, remain, leading to liability and veracity concerns that result in nagging musings over control issues. And it all is mixed in a tasty stew of promise and potential danger. This is a trend worth keeping a close eye on.

David King at *dave's blog* tells "Why Library 2.0?", "How it is about serving our customers, how it is not about technology, etc." As to Library 2.0 not being about technology, King says "yes and no." The "No" part is striking:

Technology is really just one of many tools to get at the heart of library 2.0, which is CHANGE. Libraries have not really changed for A LONG TIME. And now we are changing in a big way. Our missions have changed, our collection development policies have changed, our staffing has changed, our primary services are changing, the formats of materials that we own and loan–changing.

If you believe that your library and many others have been changing all along, you might take issue with this–and might wonder just how the fundamental library mission has changed.

The "Yes" part is that it's all partly technology, spelled out in some detail. Here's King's views are:

Of course Library 2.0 is all about technology. But not technology for technology's sake. Not technology like silly, archaic, does not-really-make-sense-to-anyone-outside-the-

library-world automation systems. The technology he is talking about goes back to the concept of meeting your customers where they already are. Our patrons are using web 2.0 services. They are using cell phones. They are gaming, and chatting, they are consuming digital content. And we as libraries need to be there, if we want to meet and greet our patrons.

Eli Edwards at *Confessions of a mad librarian* (new) says : the concepts of Library 2.0 are thrilling and intriguing and exciting. Better OPACs and ILSs, patron-centered services, making and keeping libraries at the forefront of communities–yes. I can not help to wonder that these are things we should be striving for, should have been striving for a long time and continuing to strive for, regardless of whether there's new language, new tools or new expectations.

Does using the language and tools of Library 2.0 help to us achieve this faster and more fluidly? yes hope so. And as in many other things, balance seems to be key for successful implementation – we cannot afford to leave users behind if we truly want to be leading institutions in our communities– Moreover, we should not be distracted by internecine battles over which generation is in charge and which sides are "fetishists."

Resources are scarce in many environments and quite a few workers are wary and weary of new ideas that seem to require time and labor away from their already burdened schedules and backlogs. But hope that if library workers and info pros cooperate in maximizing their resources and appreciate the needs of all of the stakeholders in their libraries, our institutions and the discipline of librarianship can avoid the wild pendulum swings of short-sighted boosterism for change and equally myopic phobia of such change, whether we are talking about electronic catalogues, comic books and videos in the library, remote reference, or microfilm replacing

print archives.

Jessamyn West at *librarian.net* expresses that – Library 2.0 is about taking the ISAR (information storage and retrieval) system that we learned about in library school–complete with feedback systems and improvements and changes based on feedback–into providing patrons with service that allows for more patron-staff interaction, more non-mediated patron-library content interaction, and more interactivity and openness in the library generally.

Technology allows us many more ways to carve up and provide access to specialized subsets of data. This can be as basic as keyword searching to pick out the books about Mozambique in the library to create a display, or providing reference to patrons. Businesses use this to make their products and services easier to use for the wired generations. Libraries can be using this to provide better, more customizable services that not only offer content to patrons but allow them to help create and modify that content.

He sees it as a more intensive way of sharing all the resources that the library already offers.

Laura Crossett at *lis.dom says :* It is an alternative take on the principles of (some variants of) Library 2.0, within the physical space of the library and on no real budget: Michael Stephens reiterates that library 2.0 is more than technology, to which, she imagine, some of us are saying, "Well, thank goodness!" Not all of us have us have huge budgets to send people to conferences or the space/time/staff support/equipment to hold DDR nights or coworkers who are hip to the latest hot tags on del.icio.us.

But does that mean we can not use any of the principles of library 2.0? Which, as many others have pointed out, are not so different from the principles of Ranganathan. No. This, then, is inaugural post for a series on low tech library 2.0.

Since we do not have a space in the library–just some bookshelves and a bulletin board–and since she works in the children's room, out of sight from the shelves, she does not see them very often. Since many of our patrons do not have home internet access, IM and e-mail would not be an option for them anyway. So she went with a very old-fashioned idea. Pictured above...are some of the most recent suggestions that have come into the suggestion envelope she put on an empty slot near the YA magazines as another way for the YA patrons to communicate with me. How is this Library 2.0?

It is where the patrons are–literally. There is a suggestion box up near the front of the library, and there is an electronic one buried in the library catalogue. Neither of these are very user-friendly nor are they where teens congregate. It is as anonymous or as open as the user wants. It is interactive–she posts responses to the requests, e.g., "Okay, the first few volumes of Ceres Celestial Legend are in my next book order. The latest in the Alice series is Alice On Her Way, which we own, and there's a new one called Alice in the Know coming out in a few months, which I'll definitely get."

It is her attempt to connect in some way with patrons and to make them feel that they have some connection with the library and with "their" librarian. Service-oriented librarianship, interacting with users and showing that their thoughts are being heard: Great library service. Library 2.0? Not really–just great, innovative library service suitable to the setting and the need.

Luke Rosenberger at *lbr* & *The gordian knot post* notes: Web 2.0 is the end of the one-way diatribe that was a vestige of Mass Marketing in the Mass Media age–Web 2.0 is about building a platform for a conversation where the voices and information flow freely. Some industry pundits have

taken to using the term "read-write web" to express this idea. To him, Library 2.0 is about crossing that same threshold–from the library as a oneway conversation to the "read-write library." What does that mean?

In Library 1.0, the resources, the authorities, the information we managed lived on the shelves, between the pages, or behind a login that we knew and managed. Knowledge came down off the shelf, we checked it out to the patron, they took it home and digested it, and they brought it back so someone else could benefit from it. In Library 2.0, however, the content and information we manage is just as likely to come from the patrons themselves. Sure, back in Library 1.0 we were more than happy to include manuscripts and published works by local authors and researchers in our local history collections; in some adventurous libraries, we even collected 'zines. But we did not have a way to actually provide a platform for our patrons to publish their own ideas, thoughts, and experiences–they had to find the means on their own. Now it is different–now we do have the means, and if we take seriously our professional mission to collect and preserve the collective knowledge and experience of our communities, we may very well start considering it a responsibility. Library 2.0 should be for us, in part, what StoryCorps has been for radio–we offer our communities the tools, the hosting, the infrastructure, and they bring the stories for us and others to learn from. The examples that are out there already are inspiring– Ann Arbor District Library has pictureAnnArbor, whose "mission is to gather, capture and share information and images that reflect everyday life in our community." The Western Springs History site built by Thomas Ford Memorial Library and the Western Springs Historical Society is another example, which reminds him of a story that heard of a UK library that made a major project of encouraging its patrons to build a comprehensive local history of the area–inside Wikipedia.

A few academic libraries have dipped their toes in this water by beginning to establish themselves as institutional repositories, but that is just a start. This is pretty scary stuff, of course, because it upsets the roles we have developed so carefully. We can not do "collection development" on a blog that we host for a patron or community organization–because we have no idea what that patron might write in the future. What if it is something controversial? Will we be forced to ask that patron to take down "inappropriate" material, or will we stand up to pressure and defend the citizen's right to post that material on library webspace? And our usual circ statistics certainly would not give any indication of all this information exchange between our patrons. But the change–the participation of our patrons–goes even further...

In Library 1.0, we professionals did the cataloguing. We decided what subject headings and classification would apply to our materials. In Cataloguing 2.0, however, we invite our users to tag materials with headings that have meaning for them. In Library 1.0, our tech services folks built, configured and ran the OPAC interface. If you wanted to use the OPAC, you came to website and used it as we gave it to you. In Library 2.0, however, sharp patrons like Jon Udell and Edward Vielmetti build catalogue interfaces that suit them–and then offer them up for others to use as well. We have no idea how you are interfacing with our system–an RSS feed from Library Elf, using our Z39.50 data in LibraryThing, using an IM bot to search from your mobile phone or a custom tool like LibX.

Of course, in Library 1.0, we were happy to take patrons' suggestions. That was part of our outreach, our way of staying in touch with our community, going clear back to John Cotton Dana in 1896–we did surveys, we held focus groups, we assembled advisory committees, we posted suggestion boxes. Just make sure you submit your suggestion in triplicate and Library 1.0 will take it under advisement. But we never

confused the suggestion box with the stacks–if the patrons had something to say, it went into the suggestion box, it wouldn't become part of the "collection." The collections and services of Library 2.0, on the other hand, are built by, built from, and built for patrons' own voices, images, video, audio, writings, needs, preferences, program code, scripting, ideas, and innovations.

The bottom line is – to him, Library 2.0 is a conversation, where the information, expertize, knowledge, resources, and materials available are just as likely to come from the patrons as they are from the shelves. As librarians in this new environment, our goal should be to encourage the broadest possible participation in the "read-write library," using all the tools available to us – new or old, and continue to do what we do best–make connections between people and the information sources they need, whether those come from the shelves, from their neighbours, from their ancestors, or from their children.

He finds this fascinating and worth pursuing. Rosenberger agrees that patron-originated tagging should enhance or work alongside professional cataloguing rather than replacing it. It is almost certain Rosenberger agrees that there needs to be a well-designed and constantly improving catalog interface for the huge number of patrons who *are not* about to roll their own–and that good library systems people will observe what pops up from "superpatrons" and use it to improve that default interface. It is believed a lot of libraries have welcomed suggestions from patrons, not "submitted in triplicate," but his point is taken.

He further recognizes that patron-originated materials do *not* replace collection development, but can certainly add to it and make the library more effective as a place where local culture is collected and preserved.Good public libraries should pay special attention to the records and ideas of their

own communities. Using "Web 2.0" tools to make that operation more powerful is in the long tradition of library creativity and change.

But Web 2.0 by no means ends mass media– it simply provides some great alternatives. Television is not going away, and neither are other mass media. Most people do not really want to create or participate most of the time. For most of us some of the time, for many of us most, of the time, and for some of us all of the time, consumption is just what we want. The creative and participative minority is important; it is still the minority.

Lorcan Dempsey has discussed library possibilities that could be linked to "Web 2.0" and the like. Dempsey's writing is eloquent and rich with ideas and would suffer in the excerpting. He says : "On demand services..." wonders when we will see on-demand library systems, which could be one aspect of "Library 2.0." To some extent, we already have– Serials Solutions' OpenURL resolver is only available as a "hosted" service, where the software and knowledeg-bases reside at the vendor but appear as distinct locally branded instances. They have probably used a dozen different Serials Solutions instances; they are *quite* distinct, except for one common assumption that will disappear in the next release. As far as any library patron is concerned, the resolver is local software.

"Potential advantages are lower cost of ownership, less risk, and smoother and more frequent upgrades. Potential disadvantages include less local customization and flexibility." We think that is right, not it would not make sense for all library software to be on-demand, and Dempsey is not suggesting such a radical change. "It may be that one reason we have not seen more on-demand solutions from existing library vendors is that running the two models together is difficult." There's more here and it is worth reading.

Mark Lindner at ... *the thoughts are broken...* because they are good, and for context: Were not bookmobiles, phone and email reference...a great leap forward for the profession? Was not the catalogue card or even library hand for that matter? Our technologies will continue to evolve and they will change how we do things, as they always have. The main relevant question is "Why we do things?" Subsequent to that being answered come the questions of "How?" And that is what we see as mostly lacking in much of the current discussions. The "Why?"

We do agree that this may be a (recurrent) wakeup call for many within the profession, but we do not see much new either, with one exception. Michael Casey quoted Dana from 1896 but he could have as easily [gone] to 1876, and earlier with a tad bit more difficulty. The one main new thing we see is the ease of feedback to the field, and/or discussion *despite* the field, that goes on now. One of the main complaints about this whole Library 2.0 meme...is the almost complete ahistoricity of much of its most proponents, and particularly the most ardent.

Meredith Farkas at *Information wants to be free.* He makes some points about the "argument": It is interesting to watch the lack of dialogue between librarians who are rah-rah Web/Library 2.0 advocates and those who think it is all a bunch of hot air. It is like two parallel conversations, with no intersections between the two conversations. The pro-2.0 people do not defend the concept and the anti-2.0 people do not seem to acknowledge any legitimacy of the idea.

Farkas understands why people dislike "Web 2.0" and sees it as being "90 percent hype, especially when so many of the Web 2.0 products are not particularly useful and do the exact same thing." To her, the good parts of Web 2.0 are *not* revolutionary. She is not sure perpetual beta is a good thing–and feels "Web 2.0 is about putting out a lot of barely useful,

half-finished applications in an attempt to capitalize on the foolishness of venture capitalists and other investors."

She does not see Web 2.0 and Library 2.0 as being the same thing. "Library 2.0 is obviously not about making money; it's about improving services to our patrons." After noting some *serious* talk, she says, "If a buzzword is going to get librarians to talk about this stuff, then I am all for it." On the other hand, a confrontational buzzword can stop some discussions cold–and her lead sentences suggest that this may be a problem with "Library 2.0" as a term.

She agrees the term is too vague and she apologizes in advance for "paradigm shift"–but the last sentence certainly sounds more transformational than additive, more confrontational than not. Ross notes in a comment, "My problem is not around the ideals that 'Library 2.0' is espousing. It is hitching the wagon to the Web 2.0 hype that makes me leery... 'Hype' is not the way to bring them around to 'our way of thinking.' In fact, it is a very dangerous dance.

"A clear vision for the future of your library" shows Farkas still "not comfortable with" aspects of Library 2.0–and finding an epiphany of sorts from her second job as a therapist, where she found herself uncomfortable following the same model for all situations.

Libraries around the world are in such different places–in terms of technology, their population, and the needs of their population. There are libraries out there that still do not even have an ILS. What does social software and the usability of library middleware mean to a library with a card catalogue and no Web site? To them, improving services may mean building a Spanish-language collection to meet the needs of a growing immigrant population. Or it may mean raising money for a bookmobile. What if they are in a rural area with a largely elderly population. Do those patrons want the same things that patrons at the Chicago Public Library want? Do

we really need a Library 2.0 or do we just need to make our libraries as usable as possible and meet the needs of our service population?

She then asks the "miracle question": "If a miracle occurred one night and all of the problems with your library were gone, how would you know that a miracle had occurred? What would be different? What would the library be like?" She suggests answering that question–finding that vision– will help you build a "clear roadmap for reaching your goal." Would that goal be anything that the people mentioned so far would recognize as Library 2.0? If it was not, would it matter?

Michael A. Golrick at *Thoughts from a library administrator* in "Library 2.0–Does it disenfranchise those who need us most?" He agrees with some of the philosophy– and sits there as City Librarian "in a community which has computers in only slightly more than half of the households." What will the rest of the households do with all the "Library 2.0" tools? Are they disenfranchised–put in a situation where the permaconnected get *superior* library service as compared to traditional library users?

He notes that his library *already* meets many of the Library 2.0 principles including user participation and flexibility. He believes "most libraries...do a spectacular job of getting incredible value for the resources we expend." He wants to be sure "the regulars" are not disadvantage by the rush to new approaches. And he believes "some of the thinkers...forget about the real-world issues which so many library administrators face." In a followup the next day, he notes Meredith Farkas' piece, saying she "asks all the right questions," and comes to his own conclusion for now:

"I am open to suggestions for more to read about Library 2.0, but at the moment, I still think that all that Library 2.0 is about is customer service. Library 2.0 simply focuses on the

technology end of customer service without any discussion of the other aspects of library work".

Michael Stephens posted an extended conversation with Golrick and adds "What I worry about is choosing to focus on one group of users to the exclusion of others. .. what about those who lack technology? What about those who lack language skills? How are we going to 'serve those users? The public library movement has its roots in acculturating immigrant groups. We need to continue that role, because the immigrants are certainly coming. In my city's school system, there are about seventy-two different languages spoken as the primary language at home. That is a challenge. How does the technology vision of Library 2.0 help libraries to meet that challenge? I am not really sure. I do know that it is a challenge that my library needs to continue to meet..."

He further adds "Technology is a tool. It is a tool that is not going to go away. You do not have to "like it" or even "get it" as long as there are library staff members who do. Am I as good at technology as I was even five years ago, never mind fifteen years ago? No, but I understand the big concepts, and know when to ask for help."

There is more, all of it good. It is clear that Golrick is not opposed to the ideas behind "Library 2.0." He does make an interesting point, one ignored by some Library 2.0 advocates: It really is not necessary for every librarian to "get it" as long as some of them do–and as long as it is possible to achieve change when change is appropriate.

Morgan Wilson at *exploded library adds that* "Why I do not like these labels" does not represent opposition to some of the ideas: If I think about the individual applications and services which tend to be associated with this technology, I can say that like Fiona on her *Blisspix* blog, I use a lot of them and generally appreciate what they can do. The main

issue is with the 2.0 labels themselves. Why is it necessary to lump all these disparate things together? After all many of them pre-date the popularity of the 2.0 labels and they did ok before this started. It is thought being labelled with a contrived 2.0 term actually detracts from what each one of these ideas has to offer.

What really object to is the language suggesting that Web 2.0 (or Library 2.0) is a revolution which people must either believe in entirely or be a clueless luddite. No, it would rather pick and choose. After all, is not that one of the common threads in all this technology– empowering people to pick and choose? Wilson also notes that the backlash is not coming from neo-Luddites; it is coming from people who may use the technology but are sick of the hype. He also notes that "Web 2.0" will run its course as a term, at which point "Library 2.0 is going to look ridiculously 2005 and librarians will look daggy for embracing it."

Marketing libraries is important and necessary–but this Library 2.0 concept is the wrong message at the wrong time. While some of the concepts are good things, it is just got the wrong name–actually any name at all causes more harm than good.

Oliver Obst, Universitat Munster adds that in my opinion Library 2.0 could be a great step forward to a more user centered library. Because it enables the user to add the value by himself and get rid of the library. This means cataloguing, filtering, searching, teaching, homepages by the user for the user. This could release staff for other tasks.

There is no need for face-to-face interactions. Things like RSS or Weblogs or Tagging can free people from interacting with real persons, if they like so. It can enable them to create their own library catalog and interact with other patrons by tagging records and sharing usage patterns. Assume that "get rid of the library" results from a German-to-

English misunderstanding–and then consider whether getting rid of librarians in these areas is entirely desirable?

Jason Boog says, "Library 2.0 movement sees benefits in collaboration with patrons". When students research term papers via Google and bloggers reiterate facts about every imaginable topic, they are stealing work from us, say some librarians. *Bloggers* are "stealing work" from *libraries*? That is a new one to me. If anything, it would think mainstream media might make such a complaint. The next three single-sentence paragraphs follow from this claim of stolen work:

So at the Internet Librarian conference, over 100 library professionals speculated about *how to survive* in a world of Web-based, user-created content. They have dubbed their initiative Library 2.0.

These innovative librarians realize that some Web 2.0 technologies, such as blogs, wikis and online databases like Google Print, are already competing for the attentions of library patrons. No minced words here: Library 2.0 is about survival. Blogs and wikis are "competing for the attentions" of library patrons.

We learn that this *movement* will "break librarians out of brick-and-mortar establishments" so they can interact with patrons through blog comments, IM and Wiki entries–which, presumably, could be and are being done *from within* actual buildings, but never mind. The piece quotes Jenny Levine saying that dependence on "closed-source vendor programs for data management" is "a crippling Web 1.0 service provider model." This is contrasted with blogs, IM and Wiki-style projects where the software is free. How do you replace an online catalogue and circulation system with blogs and Wikis?

"Library Guru" Jessamyn West says we are still suffering from the limitations of catalogue cards "but words are cheap and we should use more of them," then identifies

"three basic methods of classification: by the author, by the expert and by the people." The writer calls *librarian.net* "a central clearinghouse site for Web-fascinated librarians." But that description overstates the nature of this blog. Jenny Levine talks about attaching lots of tags to cataloguing records without disrupting the original labels.

The close has West noting that many libraries she works with "are in towns where they can not get highspeed access. How can [libraries] be obsolete when people out here are not fully using them yet?" This does not clarify Library 2.0 except to make it more confrontational–a matter of survival, talking about libraries being obsolete, focusing on a few *additional* applications as though they negate the need for library systems.

Rochelle Hartman at *Tinfoil + raccoon says in* "Rejoicing and crying over 'Upgrading to Library 2.0,'" which refers to one of Michael Stephens' posts and adds an "in-the-trenches perspective." She points out real-world issues for many librarians in many libraries, in a post well worth reading on its own. She concludes:

As much as I love learning about Library and Web 2.0 and finding ways to make technology work for patrons and colleagues, I am not sure that many libraries are ready to take even the baby steps suggested by Michael.

The real-world post drew real-world comments, several from other librarians at Rochelle's library, and this from Lori Bell, who knows the library well:

I think all the Library 2.0 stuff is very exciting, but I think if a library can do 1 or 2 of these things, they are doing well in this era of budget cuts and staff short-ages... I am continually amazed by all of the innovative and outstanding activities and programs happening at your library.... Hopefully an outsider's perspective will make you realize that you are bringing Library

2.0 to Bloomington and central Illinois and doing a darn good job of it.

Worth repeating: for real-world libraries, doing "1 or 2 of these things" well–which Rochelle's library apparently does–may be a lot more important than think tanks, committees, conferences, and "Library 2.0" as a movement.

Ross Singer at *Dilettante's ball* at "Library 1.7.02-4 pre 6" mentioned– I really, really hate this Library 2.0 meme for a couple of reasons.

- All of our problems will not, in fact, be solved with AJAX and web interfaces.
- In fact many of our problems cannot be solved by technology at all.
- This quest for 2.0 would be better served if "2.0" was a milestone on the journey to "Library 4.5"–I mean, come on folks, let's get back into innovating.
- I think it trivializes some actually *exciting* and *useful* work that I fear will continue to fly under the radar be cause it's not "Web 2.0" enough.

Singer is saying anything but a believer in the status quo. He is interested in and involved in new projects. "Exciting" and "useful" link to innovative project descriptions from the Access conference and on Dan Chudnov's blog, respectively. He finds the lumping together and the terminology both troublesome.

Comments on the post included Jonathan Williams being "absolutely astounded at the speed with which Library 2.0 has been picked up, *at least by library bloggers*". Dan Chudnov suggests the need for "slick, useful presentations" and Roy Tennant adds a solid suggestion: Well, slick presentations have their purpose, but even more impressive can be running code that solves problems. The pain

avoidance can be a powerful motivator. If we can build applications and services that prevent or alleviate pain, the slick presentations would not matter.

Roy Tennant tells that part of the difficulty in talking about Library 2.0 is the squishiness of the definition. A blogger may want to make the case that Library 2.0 is mostly about new methods of communication and social networking, whereas someone else may advocate that Library 2.0 is but Web 2.0 from a library perspective.

He finds that the more the term is made to encompass the more uncomfortable to get with using it. Under the broadest definition, he has been doing "Library 2.0" in his entire professional career, since he has been on the cusp of change from the beginning. So therefore it loses any useful meaning to him.

The definition that resonates the most for me is Dan Chudnov's: "every single thing" we do, every bit of information we publish, every way we publish it, EVERYTHING, is available via a few simple, standard protocols that "anybody" with an animal book and a text editor can make do what THEY want."... This also seems to be the point of view that Talis is taking as well... So this is getting at a definition of Library 2.0 that he can get behind, although he does not find it necessary to label it as such. The important thing is to do it–whatever you want to call it.

Moving beyond siloized "destination" systems to expose our information and services in a wide variety of methods to a diverse set of consuming applications is a *good thing.* Doing so potentially enables much more compelling and useful services than we presently offer, and can in fact lead to services that we have not even imagined yet. If that's Library 2.0, then so be it. Call it whatever you want, just stop anguishing over it. As Dan Chudnov says, "Now stop boring us, and help build it."

Ryan Eby at *libdev* raises questions in "Hiding complexity in Library 2.0" about potential difficulties with a more open architecture for an OPAC-equivalent. Sure, you should be able to tweak, add, or hide features "your patrons do not need" – although I wonder how you know what *all* of your patrons need, but how do you maintain usability as you use all this flexibility? I was surprised by one clause: "It also allows those with other requirements (such as privacy) to tweak it to meet their guidelines." This seems to suggest that professional librarians in some libraries can reasonably conclude that privacy does not matter. I would hope privacy is one of the non-tweakable *mandatory* aspects of any library system.

Eby notes that the "feature list" for Library 2.0 keeps getting longer. "Can you keep your OPAC from becoming a confusing mess? ... When someone visits your OPAC are they eased into what's available or hit head on by the thousand options they have?"

"Can you be trusted with Library 2.0?" addresses some issues raised by John Blyberg and Talis' response. "[The Talis] white-paper seems to give the impression that libraries should be able to build their own services while it would be a support nightmare for them to have access to the ILS data." Reading more closely, Eby thinks that Talis' idea of Library 2.0 is "WorldCat with an API" and notes that many would find it difficult to give up local control over data. Eby also believes the "OPAC created by many developers would likely be much better than any vendor supplied solution," which may be true but raises the question– After so many years of work on such systems, why are not they known as real-world solutions yet? In any case, Eby says "the message I'm starting to get from these conversations is that librarians can't be trusted with library 2.0."

Sarah Houghton at *Librarian in black* offers her definition of Library 2.0 that, there is a considerable contrast between her definition and some of the others. She posted "Library 2.0: New or no?" partially in response to Steven Cohen's post : .

Steven Cohen is wondering if Library 2.0 is really all that new, or if we are just packaging an age-old value in a new shiny wrapper. She thinks it is a little of both.

It seems like Library 2.0 is serving as a kick in the pants for many libraries... How long have there been console video games? 20 years? And just now we are getting them in as library programming? Perhaps Library 2.0 is just one of many perpetual regularly scheduled library-world wake up calls to re-focus on the users and what they want. She also thinks that Jenny Levine's mantra, that Library 2.0 is about collaboration and making what we do have integrated into users' daily lives, is definitely a new concept. And the technology part of it is new, imho. There are some amazing things we can do with our resources and services with today's technology. Of course that will continue to evolve as years go by. But she thinks that part of it is relatively new. The only precursor that comes to mind in the immediate past is the introduction of public computers into the library. Taking advantage of delivery methods (e.g., podcasting, instant messaging) and consumer technologies (e.g., PDAs, iPods, and other MP3 players) to deliver our content and services is a great leap forward for the profession.

One could ask whether every social phenomenon automatically deserves library programming, but that may be too strong. Have libraries had books on videogames? Yes, for years. Do most libraries have soap opera programming? Not that we know of, any more than most of them have wine tastings. Focusing on what the users want is fine, as long as those wants make sense within a library context. we think it

is reasonable to inquire as to whether every New Thing makes sense.

Stephen Abram at *Stephen's lighthouse* thinks it is good to have conversations about all the 2.0 issues and to try to get a working definition that's useful, He likes Michael's wide cast better. It is all about strategy. We have spent far too many years defining these web things in a narrow technologically-focused way. In some respects that takes our collective eyes off the ball–getting users in the door or to the site, delighting them, serving their real needs, improving the community, assisting the learner to learn, making a difference, etc. etc. Does it serve our professional and institutional needs to take a narrower definition of the 2.0 meme?

A good question–but it raises the question of why the "meme" needs to exist at all. A post in January 2006 discussed social software and some questions that librarians ought to ponder. Without including the long list of social software candidates, we agree with Michael Stephens that the questions and approaches to answers are significant:

What are they doing right? What can we learn from them? What can we copy? What are the best features, functions, etc. The answers to them have to be somewhere in: How they link people of like interests; how they link people and content; how the users define their own social networks and the purpose for them; how one might manage this so that it does not become 'just dating'; how they manage profiles; how they manage 'reputation'; how they manage user-driven privacy level management.

It is important to consider how these tools and solutions work within a library context–and, we would argue, for libraries to assure that users *understand* privacy and the potential consequences of giving it up.

Steve Lawson at *See also...* believe that Library 2.0 is

most recognizable and useful as an attempt to bring libraries' electronic services up to par with what people expect in a Web 2.0 environment. Look at the "Core Competencies" and "Design Patterns" of Web 2.0 in Tim O'Reilly's article "What is Web 2.0" and think about library examples:

"Cooperate, Don't Control": patrons hacking together AIM bot searches of the catalog (Edward Vielmetti); third parties getting RSS feeds for patron records (Library Elf); stable URLs for catalogue records (Open WorldCat).

"Harnessing Collective Intelligence": blogs (with comments enabled) as the library home page (AADL and several others); user reviews in the catalogue (Open WorldCat); exploring the use of user-added tags in the catalogue.

Embracing the "perpetual beta" by adding features and services as soon as they become practical, and not waiting for a "monolithic release."

He says, I am sympathetic to those, like Michael Stephens and company, who argue for non-technology applications of these patterns, but I find it much harder to draw clear L2/non-L2 distinctions off the Web. These are all additions, some more disruptive than others–and I would note that constant updates do not represent "perpetual beta"; they represent an approach toward updating *production-quality* services.

Lawson posted "Library 2.0: groping toward a definition through comments", mostly links, and a good set of them, but there is one paragraph that it is believed worth quoting here:

"...feeling a bit more charitable towards the idea that Library 2.0 is not just a web design philosophy, and groping toward an idea of a "pattern language" that might help us distinguish a "Library 2.0" program from a simply "good"

program.... Library 2.0 does not have to be entirely new or revolutionary to be worthwhile." Then, Why is it necessary to flag a "good program" as being "Library 2.0," as opposed to it being a good (new?) program? How does the term "Library 2.0" add value to the concepts and technologies within the many definitions of that term?

Steve Oberg at *Family man librarian* takes issue with the "inner circle syndrome in library blogland"–seeing the appearance of "an elite clique of library bloggers...all of whom know each other, give presentations at a bazillion different conferences together... constantly make references to each other's postings, often echo what each other is saying, and on and on. One current focus of their attention is something referred to as Library 2.0."

Regarding "Library 2.0" itself, while he is all for participation and other newer technologies, I am cautious about the way Library 2.0 is pitched or hailed as a 'movement' or 'rallying cry' as many seem to do, seemingly without critical evaluation or assessment. There is also an inherent meaning to the term that anything pre-Library 2.0 is passe, old, even perhaps retrograde, and I object to that.

There is a lot more here–and the post drew one of Paul Miller's lengthy comments, which again gives one the sense that Talis wishes to own "Library 2.0". It is possible to agree with his caution even if you disagree about the signs of an inner circle of frequent speakers and bloggers that all first-name one another, jump on the same bandwagons, and cross-post. We like to think the latter is only partly true, but they can no longer naively assert that it is wholly imaginary.

Steven Bell at *ACRLog* in "What do you know about Web/Lib 2.0" suggests a few places for people new to the concept to go–and notes up front, "While I don't think they will change your world, the papers and subsequent discussions are of interest and make for some worthwhile

reading." Bell does not find Library 2.0 revolutionary. He notes that his main impression is that this "sounds vaguely familiar, sort of like the things academic librarians have been doing for some time now." Which is not to say librarians do not need to be aware of new tools and technologies and the need to remain innovative.

We doubt that many academic libraries make heavy use of the social software tools espoused by Library 2.0 advocates or use modular library automation systems based on open source software, but good academic libraries certainly pay attention to the supposed principles–as do good public libraries. The reading list is unusual. Bell begins with Talis pieces and non-library Web 2.0 articles, only then moving to Michael Stephens at *ALA TechSource,* ending with Bill Drew. Bell says of Stephens that "his own vision may be a bit too tech fad-oriented for some" and that "it adds a good perspective to the conversation."

Steven M. Cohen at *Library stuff* has stayed away from "Library 2.0" in his blog, *Library stuff.* Cohen is *at least* as aware of the software being lumped under "Web 2.0" as anybody in the library field, more so than most, and has been spreading the word about new tools for more than five years.

A few days after Cohen posted "Library 2.0–Questions and Commentary." He says – "I do not talk about "Library 2.0" here for many reasons. Well, I guess I do write about Library 2.0 issues without actually using the wordage, but I rarely write "Library 2.0." First, I have not seen a clear definition of the term. Michael Stephens has mentioned that he thought Sarah Houghton's definition was one of the best he has seen...".

We do have a few questions though– How is any of this stuff new? Have not the goals of libraries for the past umpteen years been to be driven by the community? Is not that the basic premise of what a public library is? Charles W.

Robinson came up with “Give them What they Want” a long time ago, which aims to make libraries relevant to what patrons “want and need in their daily lives.” Also, how is a gaming night different than any other methods used by YA librarians to get teens and pre-teens into the library?...

Do not get us wrong. We definitely need to continue our interactions with patrons and make all libraries (not just public!) a part of the community.... But to think that “Library 2.0” is something different that what librarians have been striving for for decades is, wrong. Yes, we need more interactivity with the library catalogue. Yes, we should use the new web tools available to us to build online communities. Yes, blogs and wikis work well in a library setting. Let’s give the library back to the community, but let’s not kid ourselves into thinking that this is one of those “ah hah!” moments in the history of librarianship...

We do believe in what is being touted as “Library 2.0.” We just do not think it is anything new whose theories have not been written about before in many library books and articles. Show me what’s so new about it, besides the technology aspect. If it is just about the technology, then do not buy it, because technology is a ubiquitous concept that is changing everything, not just in libraries.

T. Scott Plutchak at *tscott in* “Librarian 5.0” calls for “a little more imagination and a bit more historical perspective” from the Library 2.0 enthusiasts.

Certainly, making good use of the latest tools and gadgets and gizmos to do a better job of reaching out to our communities and providing better services is something we should all be doing–but this is not really anything new. The move from closed to open stack libraries– radical user empowerment. Replacing the book catalogue with “that marvel of human ingenuity the card catalogue.” He suspects telephone reference was cutting edge when it first appeared.

He says, "What strikes me about much of the Library 2.0 discussion is how *library-centric* rather than *user-centric* it is." He quotes himself a decade back– Our job is *not* to build a better library. Our job is figure out how to make the very best use of our particular skills, tools, talents and abilities to help the people in our community do a better job of getting and managing the information that they need. Sometimes that means that we will be doing things that everybody expects from libraries, but sometimes it means we will be doing things that nobody ever associated with a library. And sometimes it means we will stop doing "library" things, because they are not really the things that our people need the most.

We might take issue with "information," but Scott is a medical librarian, and in that setting we think the term is perfect–for medical libraries, but not for public and most academic libraries. After some additional discussion, he says we should use all of the available tools, "just don't get hung up on thinking that the tools provide the magic. Librarians do."

Scott is harsher in "Writing and thinking," that is not a "Library 2.0 post." which includes these pointed comments– and, although Peter Suber does his best to steer a middle course, even agree with the final sentence:

"Working in the web world makes good writing difficult, because good writing takes time. And sloppy writing enables sloppy thinking. "Web 2.0" actually speaks to something specific and so it makes sense to me– "Library 2.0" is sloganeering that signifies very little. "Open access" has become a label that can be slung around wildly with each walrus, queen or fuzzy-headed caterpillar giving it just the meaning that they want it to have, and ignoring all other nuances."

The notion of using the best technology available, including all of the Web 2.0 tools, to improve library services

and to reach out more directly to our communities is one absolutely applaud. And we think that this graphic representation of how we might be looking at what we're doing has real potential. But the terms that we use to describe things are important, both in what they say directly and in their larger context, and "Library 2.0" fails to be really useful in both of these.

As a denotation of something specific, "Library 2.0" is logically vacant. This becomes clear when you begin to parse some of the chatter about whether it refers just to the technology or to something broader. If it is just the technology, then what in the world is so different about IM, Blogs, Wikis or whatever this year's cool tools are? Librarians have always used the latest technological tools. Fifteen years ago it was gopher. Twenty-five years ago it was databases distributed on CD-ROM. Thirty years ago it was 2nd generation ILSs. Thirty-five years ago it was online bibliographic databases, and so on. In the late 19th century it was the invention of that technological marvel of human ingenuity, the card catalogue. The notion that Web 2.0 tools are so radically different that they create a demarcation so significantly different that it represents a radical shift from all that has gone before and may strike as somewhat naive and historically ignorant.

On the other hand, if Library 2.0 is about more than the technology–about a focus on customer service, reaching out, embracing change, listening to users etc., etc., then what the hell was Library 1.0? Does this imply that the libraries that we have been working in for nearly a quarter of a century, and the libraries in which my mentors worked and their mentors worked were somehow anti-customer service? That they were not interested in reaching out to their communities and tailoring services to meet their needs? Why have we been going to "managing change" workshops for my entire professional life if trying to change how we do things is an idea that just arrived? If "Library 2.0" is going to mean

something it has to mean something substantially different from “Library 1.0.” We can not see it. If people have trouble defining Library 2.0, they need to try defining Library 1.0.

We understand that the pro-"Library 2.0" folks are all about better customer service and a focus on the patron. And yet, we still see too many posts where the focus is still on the library and not on the relationship between the librarian and the community. There is still far too much focus on using these tools to get people into the library.

Thomas Dowling brings an optimistic perspective to this, along with recognition that the ideas mostly are not all that new. He says – I can not think about the ideas behind Library 2.0 without getting hung up on the phrase itself. Libraries started getting on the web more than a decade ago, and had pre-web online service long before then. We started putting up major search services and tons of content years ago. Yet the implication is that somehow we're still stuck on Library 1.x?

Nomenclature aside, to the extent that we can get a handle on what Library 2.0 actually is, it seems to be the idea that we should make our services more powerful, more technologically adept, and more available to our users– including the thought that our services should go where are users are, rather than the other way around. There is nothing really earth-shattering there, but it is refreshing to hear those ideas expressed occasionally. There are some flavour-of-the-month technologies involved, with AJAX on the client and Ruby on Rails on the server and so forth, but we have to assume that they will be old hat by the time Library 2.1 rolls around.

What really is new and exciting, in our experience, is that the Library 2.0 banner is being picked up by librarians who insist that it move forward with all due speed. If there is not a commercial option that meets their needs, they will turn

to a growing set of high quality tools to build–and share–the solutions they want. Library 2.0 is not fundamentally a new set of library services, or even a new set of ideals for those services. It is a new sense of ownership over those services and a new set of relationships with both vendors and others in the library community.

So, in nut shell Library 2.0 encompasses a range of new and not-so-new software methodologies – social software, interactivity, APIs, modular software..., that can and will be useful for many libraries in providing new services and making existing services available in new and interesting ways. It also encompasses a set of concepts about library service, most of them not particularly new. These methodologies, applications and concepts will continue change within libraries.

14.5.3. How can we use Library 2.0 ?

Now the questions arise – how can we make the use of Library 2.0 services?

One of the ways is that libraries can provide rich content is to establish digital communities where patrons can get involved with the library web site. For example, a small-town library might establish a wiki where users contribute to the local history of the town. Patrons can get involved with the library blog by providing content about their library experiences. Blogs, wikis, flickrs, podcasts, and vodcasts are just some of the web 2.0 technologies that libraries might use to involve patrons with the library web site.

Another way to address the information needs of future patrons is to think of public libraries as being not only information resources, but sources of entertainment. Think of feature films, manga , DVDs, audio CDs, graphic novels, and popular fiction. Why not extend this idea of entertainment services to the library web site, and offer web services that

are not strictly informational, but also entertaining? Expecting the library to create entertaining podcasts or vodcasts might be pushing it too far, but what if the adult services librarian collected podcasts links for the library web site, or perhaps the teen services web site can host links to teen-created podcasts on the net?

Many examples that might be considered aspects of a Library 2.0 approach exist, and innovators around the world continue to demonstrate that which might be possible.

Remixing Library Services : The fundamental to the changes we anticipate for libraries is a shift from the delivery of a library service just within the library building, or simply from a library's own web site. Consequently, as well as continuing to offer services to those who come to us, we need to reach beyond the boundaries of the library space, and begin pushing services out to people in the places where they are already interacting. For example, new technologies and new attitudes make it eminently feasible to break the OPAC down into a set of functional components, and to make each of those components available for inclusion in almost any page on the web, whether library-focussed or not. The OPAC itself is enriched by this approach, and the services formerly available only via the OPAC become far more widely available, and consequently far more valuable.

Liberating library functions and data from hitherto closed systems enables users to use their library content and services in other contexts. For example, catalogue searching or loans information should be available to a student within their Course Management System or Virtual Learning Environment. Information on fines should be available within a financial application and perhaps both of these should be visible from an institutional portal.

It is not only data reflecting an information consumer's interactions with the library that should be made available,

however. In a different context, it is also important to ensure that information about the resources available from the library is disseminated as widely as possible, and made available in a manner that enables integration with other applications beyond the library's control.

One of the most frequently cited places in which such integration might usefully occur is, of course, Amazon. Since Jon Udell's useful "LibraryLookup tool" was first released back in 2002, a wide range of scripts, plug-ins and toolbars have been produced to enable a user to check whether or not an item being viewed on Amazon is also available within their own library.

The majority of these tools require someone to have downloaded and installed them before they can be used, and they also tend to be limited to providing information about a single library. As such, they are perhaps best suited to use on computers within a library, where a system administrator can install them, and where users searching Amazon can be directed to copies of the books located within the building they are in.

Moving the Library Boundaries : As library services become more visible in a range of contexts, the incentives to challenge certain aspects of the ways in which we traditionally operate grows. In many parts of the world today, an individual will be a member of a single, local, library, probably associated with the local government area in which they happen to live. They may work close to other libraries, or they may live in an area in which there are other libraries within reach, but they will tend not to have access to the services offered by these libraries. The question is– does a model in which an increasingly mobile population is able to view but not use the services of libraries other than that offered by their home city, county, or equivalent make sense any more?

We are seeing some moves towards collaborative

access agreements and even discussions about national entitlement, but at what point will this trickle become the flood that makes the traveller or commuter routinely consider using a library in a strange town in the same way that they might today seek out a Starbucks for coffee or wi-fi?

Moreover, should a library that is unable to fulfil a request for an item immediately – either because the item is on loan, or because it will have to be borrowed from another library first, inform the potential borrower that the item may well be available more quickly from a third party source such as Amazon? This would, perhaps, allow them to make an informed decision as to whether or not the cost of buying via Amazon is preferable to waiting for the library to obtain a book for lending.

Information that is Easily Discoverable : As well as exposing basic information about the institution and its services, the open library should seek to enable discovery, locating, requesting, delivery and use of the resources in its care. The physical library holdings, for example, might usefully become far more visible than they are now. OCLC has made important progress in this area, and their OpenWorldCat initiative allows searchers to find books held by participating libraries in popular search engines such as Google and Yahoo!. How much further might we go, though, in enabling the discovery of our holdings, and in allowing anyone wanting access to them to receive a copy of the desired item, whether they are a member of that library or not?

Libraries will Seek Participation : Library 2.0 also facilitates and encourages a culture of participation, drawing upon the perspectives and contributions of library staff, technology partners and the wider community.

Blogs, wikis and RSS are often held up as exemplary manifestations of Web 2.0. A reader of a blog or a wiki is provided with tools to add a comment or even, in the case of

the wiki, to edit the content. This is what we call the Read/ Write web. Talis believes that Library 2.0 means harnessing this type of participation so that libraries can benefit from increasingly rich collaborative cataloguing efforts, such as including contributions from partner libraries as well as adding rich enhancements, such as book jackets or movie files, to records from publishers and others.

Library 2.0 is about encouraging and enabling a library's community of users to participate, contributing their own views on resources they have used and new ones to which they might wish access. With Library 2.0, a library will continue to develop and deploy the rich descriptive standards of the domain, whilst embracing more participative approaches that encourage interaction with and the formation of communities of interest.

Lastly about Library 2.0, it can be said that the teens of today are the adults of tomorrow. Some of these teens are involved with podcasts, blogging, social bookmarking, and other forms of web 2.0 media. Furthermore, most teens, regardless of their web 2.0 involvement, consume video games, music, film, and TV, and this media consumption will translate over to podcats, vodcasts, and blogs when the new web tools increase in popularity.

Right now libraries are in an "opportunistic" age. The new web technologies are just now catching on, but the interest in these applications is growing every day. If libraries jump at the opportunity to add patron involvement to their web sites with these technologies, they will be ahead of the game, and ready for the adults of tomorrow.

Epilogue can be ended with the three points as narrated by Freeman. He tells that libraries will act as learning laboratories and a place for community contemplation with flexbily for the futher as briefly describe under.

14.6. LIBRARIES AS LEARNING LABORATORIES

As new technologies are created that increasingly inform the learning experience, any institution seriously considering the future of its libraries must reach a consensus on the role that it wants these facilities to play in meeting the needs not only of its current academic community but also of the community it aspires to create in the future. The principal challenge for the architect is to design a learning and research environment that is transparent and sufficiently flexible to support this evolution in use. However, we must not design space that is so generic or anonymous that it lacks the distinctive quality that should be expected for such an important building. The charge to architects is to create libraries that, themselves, learn. One key concept is that the library as a place must be self-organizing–that is, sufficiently flexible to meet changing space needs. To accomplish this, library planners must be more entrepreneurial in outlook, periodically evaluating the effective use of space and assessing new placements of services and configurations of learning spaces in response to changes in user demand.

The use of electronic databases, digitized formats, and interactive media has also fostered a major shift from the dominance of independent study to more collaborative and interactive learning. A student can go to this place called the library and see it as a logical extension of the classroom. It is a place to access and explore with fellow students information in a variety of formats, analyze the information in group discussion, and produce a publication or a presentation for the next day's seminar.

Libraries must provide numerous technology-infused group-study rooms and project-development spaces to address this need. As laboratories that learn, these spaces are designed to be easily reconfigured in response to new technologies and pedagogies. In this interactive learning

environment, it is important to accommodate the sound of learning–lively group discussions or intense conversations over coffee–while controlling the impact of acoustics on surrounding space. We must never lose sight of the dedicated, contemplative spaces that will remain an important aspect of any place of scholarship.

Ten or fifteen years ago, we were taking all the teaching facilities out of libraries. The goal was to purify the library–to separate it from the classroom experience. Today, these spaces are not only back in the library but also back in a more dynamic way than ever. Although they sometimes add to the stock of the institution's teaching spaces, more significantly, they take advantage of a potential to become infused with new information technologies in a service-rich environment.

The faculty plays a significant role in drawing students to the library in this regard. Now that information is available almost instantaneously anywhere on campus, faculty expect their students to use their time in the library thinking analytically rather than simply searching for information. Faculty also see the library as an extension of the classroom, as a place in which students engage in a collaborative learning process, a place where they will, it is hoped, develop or refine their critical thinking.

Several years ago, we designed a number of facilities in academic libraries that were expressly aimed at helping faculty members advance their own understanding and use of changing information technologies. We now provide special kinds of teaching spaces for the application of these skills as faculty members have become increasingly sophisticated in their use of technology. At the same time, traditional and often-arbitrary boundaries among disciplines are breaking down. In response to these changes, interactive presentation spaces and virtual reality labs are becoming the norm. Faculty

members can now make connections with interrelated disciplines or disciplines other than their own and access resources regardless of their locations.

Thus the library is regarded as the laboratory for the humanist and social scientist.

14.6.1. A place for Community Contemplation

One of the fascinating things that we are now observing is the impact of redesigned library space on the so-called psychosocial aspects of an academic community. The library's primary role is to advance and enrich the student's educational experience; however, by cutting across all disciplines and functions, the library also serves a significant social role. It is a place where people come together on levels and in ways that they might not in the residence hall, classroom, or off-campus location. Upon entering the library, the student becomes part of a larger community–a community that endows one with a greater sense of self and higher purpose. Students inform us that they want their library to "feel bigger than they are." They want to be part of the richness of the tradition of scholarship as well as its expectation of the future. They want to experience a sense of inspiration.

While students are intensely engaged in using new technologies, they also want to enjoy the library as a contemplative oasis. Interestingly, a significant majority of students still consider the traditional reading room their favourite area of the library–the great, vaulted, light-filled space, whose walls are lined with books they may never pull off the shelf.

14.6.2. Flexibility for the future

If libraries are to remain dynamic, the spaces that define them and the services they offer must continually stimulate users to create new ways of searching and synthesizing

materials. There is no question that almost all the library functions being planned for today will need to be reconfigured in the not-too-distant future. While certain principal design elements–such as the articulation of the perimeter wall, the introduction and control of natural light, and the placement of core areas for stairs, toilets, and heating, ventilation, and air conditioning–will remain relatively constant, the majority of space must be capable of adapting to changes in use. If this is to happen, a number of fundamental considerations must be addressed.

In the past, expanding collections reduced user space; now, it is just the opposite. Technology has enriched user space, and the services for its support are increasing at a much faster pace than ever anticipated. Today, we are asked to consider whether a facility can accommodate dense, compact shelving or whether collections should be moved off-site. Is the library to be a major research facility, responsible for the acquisition and preservation of substantial collections? Or is the library to focus its energy and space on teaching and learning? Regardless of any specific answer, one thing is common to all– if an institution's goal is to increase and celebrate scholarly activity on its campus, then a flexible, reinvigorated library must become a focus of its community.

Large, open spaces were designed to be reconstructable so that they could be reconfigured to meet future needs. Enclosed areas for conference rooms, private and semiprivate offices, seminar rooms, and group-study rooms were planned so that in the future, these spaces could be incorporated into the open reference and computing commons area.

So the library as place holds a unique position on campus. No other building can so symbolically and physically represent the academic heart of an institution. If the library is to remain a dynamic life force, however, it must support the

academic community in several new ways. Its space must flexibly accommodate evolving information technologies and their usage as well as become a laboratory for new ways of teaching and learning in a wired or wireless environment. At the same time, the library, by its architectural expression and setting, must continue to reflect the unique legacy and traditions of the institution of which it is part. It must include flexible spaces that learn as well as traditional reading rooms that inspire scholarship. By embracing these distinct functions, the library as a place can enhance the excitement and adventure of the academic experience, foster a sense of community, and advance the institution into the future.

Appendices

APPENDIX-1

LINKS AND RESOURCES

The following is a guide to links and other sources of information on digitization.

Accessibility and ADA Compliance

- ADA Home Page: *http://www.usdoj.gov/crt/ada/adahom1.htm*
- Bobby™ accessibility testing utility: *http://bobby.watchfire.com/bobby/html/en/index.jsp*
- Lynx viewer: *http://www.delorie.com/web/lynxview.html*

Best Practices

- Arts and Humanities Data Service: *http://www.ahds.ac.uk/creating/case-studies/index.htm*
- Berkeley Digital Library SunSITE: *http://sunsite. berkeley.edu*
- Digital Library Federation: *bttp:/lwww.clir.orgldiglibl dlfhomepage.htm*
- IMLS, A *Framework of Guidance for Building Good Digital Collections: http://www.imls.gov/pubs/forumframework.htm*
- NINCH Guide to Good Practice in the Digital Representation and Management of Cultural Heritage Materials: *http://www.nyu.edu/its/humanities/ninchguide*
- Oxford Text Archive Guides to Good Practices: *http://ota.ahds.ac.uk/documents/creating*
- University of Virginia Electronic Text Center: *http://etext.*

lib.virginia.edu

Collaboration

- Arts and Humanities Data Service: *http://ahds.ac.uk/*
- California Digital Library: *http://www.cdlib.org*
- Colorado Digitization Project: *http://www.cdpheritage. org*
- Consortium of Research Libraries CEDARS Project: *http://www.leeds.ac.uk/cedars/*
- Distributed National Electronic Resource: *http://www.jisc.ac.uk/dner/*
- Institute of Museum and Library Services: *http://www.imls.gov*
- National Library of Australia: *http://www.nla.gov. aulpadil*
- National Library of Canada: *http://www.nlc-hnc.ca/*
- National Science Foundation Digital Library Initiative: *http://dli2nsf.gov*
- New Opportunities Fund: *http://www.nof.org.uk/*
- Online Archive of California: *http://www.oac.cdlib.org/*
- UKOLN: *http://www.ukoln.ac.uk/*

Conferences

- Extreme Markup Languages: *http:/l www.extrememarkup.com*
- InfoLibrararian: *http://www.infolibrarian.com*
- Internet Librarian International: *http://www.infotoday.com*

Digitization Policies

- Digital Library of Georgia Collection Development Policy:*http://dlg.galileo.usg.edu/colldev.html*
- National Library of Australia Digitisation Policy: *http://www.nla.gov.au/policy/digitisation.html*

Encoded Archival Description

- EAD Help Pages: *http:lljefferson.village.virginia.edu/ead/*

- Network Development and MARC Standards Office of the Library of Congress: *http://www.loc.gov/marc/ndmso.html*

Funding

- Arts and Humanities Research Board (AHRB): *http://www .ahrb.ac.uk/*
- Arts and Humanities Data Service (AHDS): information for those applying for AHRB awards: *http://ahds.ac.uk/ ahrb/ index.htm*
- Colorado Digitization Program: Funding Resources: *http:// www.cdpheritage.org/resource/funding/rsrcjunding.html*
- Digital Libraries Initiative Phase 2: *http://www.dli2. nsf.gov/*
- Foundation Center: *http://www.fdncenter.org/*
- Institute for Museum and Library Services: *http://www. imls.gov*
- National Endowment for the Humanities: *http://www. neh.gov*
- New Opportunities Fund: *http://www.nof.org.uk/*
- Technology Grant News: *http://www.technologygrantnews. com/*
- University Grants Commission: *http://www.ugc.ac.in*

Hardware

- Computers:
  - *http://www.cnet.com*
  - *http://www.dell.com*
  - *http://www.gateway.com*
  - *http://www.pcmag.com*
  - *http://www.pcworld.com*
  - *http://www.zdnet.com*
- Scanners:
  - *http://www.epson.com*
  - *http://www.hp.com*
  - *http://www.microtekusa.com*
  - *http://www.scanstore.com*

- *http://www.scantips.com*
- *http://www.umax.com*
- *http://www.visioneer.com*

- Digital cameras:
  - *http://www.canon.com*
  - *http://www.dcresource.com*
  - *http://www.dcviews.com*
  - *http://www.dpreview.com*
  - *http://www.minolta.com*
  - *http://www.nikon.com*
  - *http://www.olympus.com*
  - *http://www.pentax.com*
  - *http://www.sony.com*

Metadata

- Dublin Core: *http://dublincore.org*
- METS: *http://www.loc.gov/standards/mets/*

Preservation

- CEDARS: *http://www.leeds.ac.uk/cedars/*
- Cornell Online Tutorial on Digital Preservation: *http://www.library.cornell.edu/iris/tutorial/dpm/index. html*
- D-lib Magazine: *http://www.dlib.org*
- Digital Preservation Coalition: *http://www.jisc.ac.uk/dner/preservation/prescoalition.html*
- Library of Congress National Digital Infrastructure Preservation Program: *http://www.digitalpreservation. gov//ndiipplreporlrepor_ home.html*
- NINCH Guide to Good Practice in the Digital Representation and Management of Cultural Heritage Materials: *http://www.nyu.edu/its/humanities/ninchguidel*
- OAIS: *http://www.ccsds.org/documents/pdf/CCSDS-650.0-R-2.pdf*
- OCLC/RLG Preservation Metadata Working Group: *http://www.oclc.org/research/pmwg/*

- Preservation Management of Digital Materials: A Handbook: *http://tvww.dpconline.org/graphics/handbook/index.html*
- Preserving Access to Digital Information (PADI): *http://www.nla.gov.au/padi/*
- Report of the RLG Task Force on Archiving of Digital Information: *http://www.rlg.org/ArchTF/*
- UNESCO Guidelines for the Preservation of Digital Heritage: *http://portal.unesco.org/ci/ev.php?URL_ID=8967&URL_DO=DO_TOPIC&URL_SECTION%3E=201&reload=1049879672*

Professional Organizations

- American Society for Information Science and Technology:*http://www.asis.org*
- Association for Computing and the Humanities: *http://www.ach.org*
- Society of American Archivists: *http://www.archivists.org*

Selection Criteria

- Oklahoma State University Library Electronic Publishing Center: *http://digital.library.okstate.edu/suggest.html*
- Oxford University: *http://www.bodley.ox.ac.uk/scoping/report.html*

Software

- HTML editing programs:
  - Arachnophilia: *http://www.arachnoid.com*
  - Macromedia Dreamweaver: *http://www.macromedia.com/software/dreamweaver*
  - Microsoft FrontPage: *http://www.microsoft.com/frontpage*
  - Netscape Composer: *http://wp.netscape.com/browsers/using/newusers/composer*
  - Note Tab Pro: *http://www.notetab.com*
- Imaging Programs:
  - Adobe Photoshop: *http://www.adobe.com/products/*

photoshop
  - Jasc Paint Shop Pro: *http://www.jasc.com*
- Page Layout Programs:
  - Adobe InDesign: *http://www.adobe.com/productsl indesign*
  - Adobe PageMaker: *http://www.adobe.com/products/ pagemaker*
  - QuarkXPress: *http://www.quark.com*
- PDF Programs:
  - Adobe Acrobat: *http://www.adobe.com/products/ acrobat*
- Text Editing/Word Processing Programs:
  - Corel WordPerfect: *http://www.corel.com*
  - Microsoft Notepad: *http://www.microsoft.com*
  - Microsoft Word: *http://www.microsoft.com/office/ word*
- OCR Programs:
  - OmniPage Pro: *http://www.scansoft.com*
  - Prime Recognition: *http://www.primerecognition. com/*
- Scanning Suites:
  - ScanSoft PaperPort: *http://www.scansoft.com*
  - WOCAR 2.5 : *http://tucows.wave.net.br/system/ preview/234813.html*
- XML Editing Programs:
  - Note Tab Pro: *http://www.notetab.com*
  - XML Spy: *http://www.xmlspy.com*
  - XmetaL: *http://www.softquad.com*
- XSLT Processors:
  - Saxon: *http://saxon.sourceforge.net/*
- FTP Programs:
  - WS_FTP: *http://www.ipswitch.com*
- Freeware and Shareware Programs:

- *http://www.download.com*
- *http://www.tucows.com*

Standards

- NISO: *http://www.niso.org*
- Unicode: *http://www.unicode.org*

Text Encoding Initiative (TEI)

- TEI Consortium: *http://www.tei-c.org*

Training

- Amigos Library Services: *http://www.amigos.org*
- Colorado Digitization Project: *http://www.cdpheritage.org/*
- HATII at the University of Glasgow: *http://www.hatii.arts.gla.ac.uk/*
- Information Library Network : *http://www.inflibnet.ac.in*
- Northeast Document Conservation Center School for Scanning: *http://www.nedcc.org/*
- Rare Book School at the University of Virginia: *http://www.virginia.edu/oldbooks/*
- University College London School of Library, Archives, and Information Studies: *http://www.ucl.ac.uk/admission/ gsp/current/study/depts/art/library.html*
- University of New Brunswick: *http://www.lib.unb.ca/Texts/*

Tutorials

- Cornell University, *Moving Theory into Practice: http://www.library.cornell.edu/preservation/tutorial/*
- Text Encoding Initiative (TEI) Tutorials and Guides to Local Practice: *http://www.tei-c.org.uk/Tutorials/index.html*

XML

- *The XML Bible : http://metalab.com*
- XML Cover Pages: *http://www.oasis-open.org/cover/*
- XML for the Humanities: *http://xml.lexilog.org.uk*

Website Design and HTML

- HyperText Markup Language (HTML) Home Page: *http://www.w3.org/MarkUp*
- HTML Goodies: *http://www.htmlgoodies.com*
- HTML Tags: *http://html-tags.info*
- Sizzling HTML Jalfrezi: *http://freespace.virgin.net/sizzling.jalfrezi/iniframe.htm*
- Visibone : *http://www.visibone.com*
- World Wide Web Consortium: *http://www.w3.org*

APPENDIX- 2
INTERNET COMPANIES, LIBRARY AUTOMATION VENDORS AND INFORMATION ORGANIZATIONS

This appendix is an effort to describe the general business and focus on several dot-coms, library vendors and organizations. The text of the descriptions is based on the book *The Ultimate Digital Library* by Pace and updation from the websites of these organizations.

ADOBE

Founded in 1982, Adobe Systems, Inc., builds award-winning software solutions for network publishing, including web, print, video, wireless, and broadband applications. Its graphic design, imaging, dynamic media, and authoring tools enable customers to create, publish, and deliver visually rich content for various types of media. Adobe is the second largest PC software company in the United States, with annual revenues exceeding $1.2 billion. It employs over 2,800 employees worldwide.

ASK JEEVES

Ask Jeeves, Inc., is a leading provider of natural language, question-answering, and search technologies for consumers and companies. The company offers these technologies through two business units– Web Properties, a set of online media properties and search services; and Jeeves Solutions, an enterprise software business. Ask Jeeves Web Properties operates leading websites that provide consumers with a simple and fast way to find relevant answers to their questions. Ask Jeeves also syndicates its advance search technologies to web portals and content and destination sites to help companies increase user loyalty while generating revenue. Ask Jeeves Web Properties includes Ask.com, Ask.co.uk, Teoma.com, and Ask Jeeves for Kids.

CLIO

CLIO is the most widely used interlibrary lending management system available today. More than 800 institutions have purchased Clio based upon recommendations from other ILL professionals and workshops on improving ILL operations. CLIO is used in 48 U.S. states, the District of Columbia, Canada, Hong

Kong, Australia, England, Scotland, and Wales. It is a complete ILL management system for the new world of information.

DIGITAL LIBRARY FEDERATION

The Digital Library Federation (DLF) is a consortium of libraries and related agencies that are pioneering in the use of electronic-information technologies to extend their collections and services. Through its members, the DLF provides leadership for libraries by identifying standards and "best practices" for digital collections and network access; coordinating leading-edge research and development in libraries' use of electronic-information technology; and helping start projects and services that libraries need but cannot develop individually. The DLF operates under the administrative umbrella of the Council of Library and Information Resources.

DIGITAL OWL

DigitalOwl provides information-management application services that leverage digital rights management to solve critical business problems. Its products and services enable customers to securely license, promote, distribute, and manage premium information within end-user communities. Focused on secure information movement in financial, health care, publishing, and corporate markets, DigitalOwl understands the information issues facing these companies today and how to solve them effectively.

DOCUTEK

Docutek Information Systems is an Internet company that specializes in developing products and services for the educational market. It was one of the first companies to develop a web-based electronic reserve system, ERes, and web-enables a host of other library services through Docutek onCampus. ERes is the worldwide electronic reserves leader–nearly two million students at over 200 institutions spanning three continents have access to its services. Docutek strives to develop cutting-edge, cost-effective solutions that enhance the educational experience and enable academic institutions to better serve their students and faculty.

EBRARY

Ebrary is a leading provider of information distribution and retrieval services. The company's customizable ebrarian solution combines powerful software with copyright-protected books, journals, periodicals, and other online documents provided by more than 100 of the world's leading publishers. The ebrarian solution enables libraries, institutions, and other organizations to give their users access to high-value, authoritative materials and research tools that allow them to interact with content at the word level. Ebrary's publishing partners benefit from new sales and marketing opportunities on the Internet. Ebrary is privately held and is funded by Random House Ventures LLC Pearson PLC, and the McGraw-Hill Companies.

EGAIN

EGain is a leading provider of eService software for the Internet, helping businesses transform their traditional call centers into multichannel eService networks. EGain's solutions for e-mail management, interactive web collaboration, intelligent self-help agents, knowledge management, and proactive online marketing can measurably improve operational efficiency and customer retention–resulting in significant return on investment.

ELIBRARY

ELibrary is a comprehensive digital archive for information seekers of all ages. Users can do business research, use it for homework, get background materials for term papers, find out about both current and historical events, and more, all in one vast database designed for both depth of content and simplicity of interface. Subscribers can ask questions in plain English, and eLibrary searches a billion words and thousands of images and quickly return the information requested. With its one-stop research access, eLibrary aggree gates hundreds and hundreds of full-text periodicals, nine International newswires, classic books, hundreds of maps, and thousands of photographs, as well as major works of literature, art, and reference.

ENDEAVOR INFORMATION SYSTEMS

Endeavor Information Systems Inc., has been providing

integrated library management systems since its inception in 1994. With an executive team base that has a strong heritage in the library industry, Endeavor grounds its product line development in knowledge, commitment, and the embrace of proven new technologies. The first Voyager ILS was sold to Michigan Technological University, and Endeavor's momentum has continued since that time. With library customers of all sizes and a commitment to forward-thinking product development, Endeavor Information Systems is poised for the future of library collection management.

EPIXTECH

With more than 7,000 customer libraries, epixtech is the leader in installed library systems and serves public, academic, special, and school libraries around the world. Epixtech, Inc., was formed in December 1999 by the private investment purchase of Ameritech Library Services from SBC Ameritech. Ameritech Library Services had been formed by the merger of Dynix and NOTIS Systems, Inc.–two premier library systems providers. Epixtech continues to lead the industry as the largest library systems provider in the world, with more than twenty years of experience.

EX LIBRIS

Ex Libris group is a worldwide supplier of software solutions and related services for libraries and information centers. The company's flagship product, ALEPH 500, is a market leader in the field of library automation for higher education as well as for public, national, and research libraries, consortia and national networks, and large corporations. Based in Israel, Ex Libris has five fully owned subsidiaries–in the United States, the United Kingdom, Germany, Australia, and Luxembourg. Its staff consists of trained employees worldwide with a core development team that includes both highly qualified librarians and expert software engineers. Local offices and distributors provide sales, project management, and support operations. In addition, the company offers analysis, data conversion, project management, and training services as part of its policy to tailor the solution to the specific institution and to help local staff learn how to use the system to it fullest capabilities.

EZPROXY

EZproxy is an easy-to-set-up and easy-to-maintain program for providing your users with remote access to web-based licensed databases. It is available for servers running Linux, Solaris, or Windows NT. It operates as an intermediary server between your users and your licensed databases. Your user connects to EZproxy, then it connects on their behalf to your licensed databases to obtain web pages and send them back to your users. The result is a seamless access environment for your users without the need for automatic proxy configuration files. EZproxy only alters references to your database vendor's web pages, so if your database vendor provides additional links to other free web pages on the Internet, these are left as is. In this manner, if your users elect to follow one of these links, the EZproxy server is automatically taken out of the communication loop.

GEMSTAR

Gemstar eBook Group, Ltd., focuses on developing state-of-the-art technology for dedicated reading devices and provides reading content for these devices. Gemstar eBook Group is a subsidiary of Gemstar TV Guide.

ILLIAD

The OCLC ILLiad resource-sharing management software automates routine interlibrary loan functions so you can provide faster service in a modern, paper-free environment. Library staff save time by managing all of their library's borrowing, lending, and document delivery through a single windows-based interface. Library users can easily send and track their requests electronically through the Web. OCLC ILLiad automatically processes filled requests and contacts users when requests are completed.

INFOTRIEVE

Infotrieve Inc., is the definitive research portal, leading the market in article research and delivery. Its mission is to facilitate efficient, affordable, and innovative methods of distributing published materials to end-users, while protecting the rights of the information provider. To fulfill this mission, Infotrieve creates a one-stop shopping source, offering end-to-end capabilities for library

and research needs. Combining high responsiveness with cost efficiency, the extensive Infotrieve network provides access to the world's largest library of journal content, exemplified by its breakthrough system, Virtual Library. Vast information and journalistic resources are available with varied choices in distribution, namely aggregated electronic and paper delivery, a distinct advantage over paper-only aggregation.

INNOVATIVE INTERFACES

Innovative Interfaces Inc., was founded in 1978 and promptly made history with the first "black box" for libraries--a highly successful online interface that allowed libraries to download bibliographic data from OCLC to a local circulation system in real time, without rekeying. More than twenty years later, Innovative is still making history and setting the standard for excellence in library automation. Innovative is privately owned and exclusively involved with library automation and libraries. Thus, the company is totally focused on delivery and support of best-in-class software and services.

JSTOR

Originally conceived, by William G. Bowen, President of the Andrew W. Mellon Foundation, JSTOR began as an effort to ease the increasing problems faced by libraries seeking to provide adequate stack space for long runs of back files of scholarly journals. In the broadest sense, JSTOR's mission is to help the scholarly community take advantage of advances in information technologies. In pursuing this mission, JSTOR has adopted a system-wide perspective, taking into account the sometimes conflicting needs of libraries, publishers, and scholars. JSTOR's goals include the following: to build a reliable and comprehensive archive of important scholarly journal literature; to dramatically improve access to these journals; to help fill gaps in existing library collections of journal back files; to address preservation issues such as mutilated pages and long-term deterioration of paper copy; to reduce the long-term capital and operating costs of libraries associated with the storage and care of journal collections; to assist scholarly associations and

publishers in making the transition to electronic modes of publication; and to study the impact of providing electronic access on the use of these scholarly materials.

KANA

KANA was founded in 1996. It provides the industry's leading external-facing eCRM solutions to the largest businesses in the world, helping them to better service, market to, and understand their customer and partners, while improving results and decreasing costs in contact centers and marketing departments. Through comprehensive, multichannel customer-relationship management that combines the best-in-class KANA iCARE architecture with enterprise applications, KANA has become the fastest-growing provider of next-generation eCRM technology. The company's customer-focused service, marketing, and commerce software applications enable organization– to improve customer and partner relationships by enabling them to productively interact when, where, and how they want–across all touch points including web contact, web collaboration, e-mail, and telephone. KANA has twenty-two locations worldwide.

LIBRARYHQ.COM

LibraryHQ.com hosts varied resources and services for the wired librarian, including SiteSource, a subscription service of catalogued websites; MARCit, a downloadable source for electronic resource cataloging records; SiteServices, web customization services; and iKnow, a web-based catalogue interface.

LIVEPERSON

LivePerson is a provider of online sales and customer service solutions. Over 2,500 websites currently use LivePerson solutions to answer customer questions, satisfy customers, build relationships, and deliver results. LivePerson Exchange enables operators to interact online with their customers at critical moments during their visit. LivePerson offers websites a timely and cost-effective means of providing customers with a number of options to communicate with them online. Combining the interactive nature

of the Internet with the dependability of traditional customer service, LivePerson can help you build strong and lasting relationships, convert browsers into buyers, and turn one-time visitors into loyal customers.

LIZARDTECH

LizardTech develops imaging software and solutions that simplify and enhance the distribution, management, and control of digital images and documents. LizardTech is focused on innovative solutions that provide users of all levels with bandwidth optimization and instant access to high-resolution, multipurpose digital images and multimedia content.

LUNA IMAGING

Luna Imaging Inc., makes it easier than ever to build comprehensive digital image collections by offering state-of-the-art image management software, Insight, along with a variety of ways to quickly and easily build your collections. Collection managers can digitize their own image collections and incorporate them into Luna's Insight software, share content with other institutions that use Insight, subscribe to digital image collections through a variety of Luna's content partners, or license digital images from the growing number of Insight-ready image collections now available.

MUSEGLOBAL

Muse delivers a one-stop integrated search environment offering better, more effective ways to aggregate, disseminate, and deliver real-time information for individual libraries and groups of libraries. Muse offers expanded information services to patrons, such as customized interfaces for member organizations, "branded" delivery of information, optimized and refined delivery of results, and consistency. It provides broadcast searching of web, Z39.50, SQL, and proprietary data sources simultaneously. Muse's Just in Time Enrichment service enhances bibliographic record display so that information such as tables of contents, book reviews, and jacket art can be added in real time to record results.

NETLIBRARY

NetLibrary was founded in August 1998. It is one of the world's

leading providers of electronic books and helps academic, public, corporate, and special libraries create a richer, more productive learning environment for their patrons. By combining the time-honoured traditions of the library system with electronic publishing, netLibrary offers an easy-to-use information and retrieval system for accessing the full text of reference, scholarly, and professional books. NetLibrary is a division of the Online Computer Library Center (OCLC), a nonprofit organization that provides computer-based cataloging, reference, resource-sharing, and preservation services to libraries worldwide.

NISO

NISO, the National Information Standards Organization a nonprofit association accredited by the American National Standards Institute, identifies, develops, maintains, and publishes technical standards to manage information in our changing and ever more digital environment.

NISO standards apply both traditional and new technologies to the full rang of information-related needs, including retrieval, repurposing, storage, met; data, and preservation. NISO was founded in 1939, incorporated as a not-for profit education association in 1983, and assumed its current name the following year. NISO draws its support from the communities it serves. The leaders of more than seventy organizations in the fields of publishing, libraries information technology, and media serve as its voting members. Hundreds of experts and practitioners serve on NISO committees and as officers of the association.

NORTHERN LIGHT

Northern Light uses patented classification intelligence and precision relevancy ranking to deliver accurate, relevant results from its special collection of more than 7,100 respected full-text publications, which are organized into "custom search folders" so that users do not have to waste time weeding through useless information. Enterprise clients can also search an index of more than 350 million web pages. With Northern Light's SinglePoint custom content-integration service, customers can even search their licensed third party content and internal content, all with a single query, classified to a uniform standard and relevance ranked, thus

using all the information available to them in one simple operation.

OCLC

OCLC, the Online Computer Library Centre was founded in 1967 by university presidents to share library resources and reduce library costs. It is a nonprofit membership organization serving 41,000 libraries in 82 countries and territories around the world. Its mission is to further access to the world's information and reduce library costs by offering services for libraries and their users. OCLC will be the leading global library cooperative, helping libraries serve people by providing economical access to knowledge through innovation and collaboration.

QUESTIA

Questia is the first online library that provides 24/7 access to the world's largest online collection of books and journal articles in the humanities and social sciences. You can search each and every word of all of the books and journal articles in the collection. You can read every title cover to cover. This rich, scholarly content–selected by professional collection development librarians–is not available elsewhere on the Internet. Undergraduates, high schoolers, graduate students, and Internet users of all ages have found Questia to be an invaluable online resource. Anyone doing research or just interested in topics that touch on the humanities and social sciences will find titles of interest in Questia.

REED ELSEVIER

Reed Elsevier is a world-leading publisher and information provider, operating in four core segments – Science and Medical, Legal, Education, and Business. Its principal activities are in North America and Europe and the company employs approximately 37,000 people. Reed Elsevier's key objective is to be the indispensable source of information-driven services and solutions to its target customers through the delivery of highly valued and demonstrably superior and flexible solutions, increasingly via the Internet.

SIRSI

The Sirsi Corporation recognizes that libraries today are on

a mission to break down walls–barriers that limit the information and resources accessible to library users. A partner with academic, public, school, government, and special libraries, as well as consortia, Sirsi delivers software and services that assist libraries in expanding the diversity of their user communities and enhancing the library experience of those users. At Sirsi, our more than twenty-five years in the business have been focused on providing software and services that help libraries of all types and sizes serve their user communities. And since the merger with Data Research Associates (DRA), Sirsi has even more to offer, from e-library, integrated library management, and digital archiving solutions to a comprehensive slate of library technology services.

SWETS BLACKWELL

Swets Blackwell provides numerous options for academic, medical, corpora and government libraries and information centers worldwide. Its range information and serials management services assist in optimizing resources– today's dynamic and increasingly complex electronic environment. Acting as a intermediary between libraries and information centers, Swets Blackwell world with publishers to provide customers with services for all types of serials.

SPARC

SPARC, the Scholary Publishing and Resource Coalition is an alliance of universities, research libraries, and organizations which was founded as a constructive response to market dysfunctions in the scholarly communication system. These dysfunctions have reduced the dissemination of scholarship and crippled libraries. SPARC serves as a catalyst for action, helping to create systems that expand information dissemination are use in a networked digital environment while responding to the needs scholars and academia. SPARC'S agenda focuses on enhancing broad are cost-effective acçess to peer-reviewed scholarship.

SYNDETIC SOLUTIONS

Syndetic Solutions is a provider of specialized bibliographic data to producers of electronic databases in the retail book trade, and a developer of custom thesauri, indexes, and vocabulary analysis and processing services for database producers, Internet

search engines, and Internet directory services.

TDNET

TDNet's unique solution to electronic journals management is based on – original approach integrating a diversity of access modes to electronic journals on one unified, coherent site. TDNet is a custom-made e-journal service, tailored to include all and only a library's chosen titles, and to reflect the library's current access arrangements for every title on the system. TDNet database currently holds over 28,000 e-journal websites and table of conter records for over 25,000 titles. The requests for titles which have not yet been added to TDNet's fast-growing database are welcome. TDNet's team constantly browses the web for more titles. TDNet is a perfect solution for academic, medical, corporate, and government organizations.

TLC

TLC, The Library Corporation has evolved from providing MARCFICHE to more than 5,000 libraries in the 1970s and 1980s. TLC's ability to provide needed solutions to the library world and its place in the library marketplace were strengthened by the company's June 2000 acquisition of the CARL Corporation, a developer of technological solutions used by the largest public libraries in the United States and across the world. TLC's groundbreaking products include the pioneering cataloguing system BiblioFile and the powerful automation systems Library. Solution and CARL.Solution, both are used in libraries of all sizes throughout the world.

24/7

24/7 Reference is a set of software tools that enables librarians to provide real-time reference assistance to their patrons over the Internet. Each library can customize these tools to best serve its community.

VIRTUAL REFERENCE DESK

The Virtual Reference Desk is a suite of products and services specifically designed to make web reference service easy, quick, and cost-effective for libraries. The backbone of LSSI's Virtual Reference Desk is the web collaboration software which is

sometimes also called Web Contact Center Software. LSSI has taken the same web collaboration software used so effectively by Webhelp and other major e-commerce sites and adapted it for use by libraries.

VTLS

VTLS Inc., is an international market leader in the development of solutions for library automation, resource-sharing networks and digital libraries. These solutions, Virtua ILS (Integrated Library Systems), Visual MIS (Multimedia and Imaging Solutions), and Vista CPS (Companion Product Suite), easily work in tandem or apart. During the past few years, more than 900 libraries have chosen VTLS's software and services as the superior solution for their collections. Customers include academic, public, corporate, and special libraries located throughout the United States, Canada, and thirty-two other countries including India.

WEBHELP

The ARENA eCRM Suite, comprising the next generation of online customer-relationship management products, has been built on years of extensive CRM and eCRM experience. It offers industry-leading technology solutions that enable businesses to provide online customer support in a quick and cost-effective manner. The integral part of Webhelp's ARENA eCRM technology platform is a proprietary Web Application Event Framework, a open standards-based "zero-latency" framework that enables "true" real-time online communication. Components that enable services such as live chat an e-mail communication can be independently added, modified and combine to meet the specific needs of each client.

XANEDU

The keystone of XanEdu's success is a suite of unparalleled resources the empower faculty to create print and digital coursepacks. XanEdu's enormous collection of digital content, its fully customizable coursepack system research tools, and copyright and expert developmental support offer even thing needed to create the perfect resource to enhance the classroom–an virtual classroom–experience.

Bibliography

Agarwal, Nitish. 2006. Web Services in Digital Libraries. Rajat Publications, New Delhi.

Agarwal, Vibhuti. 2006. Virtual Collections in Digital Libraries. Rajat Publications, New Delhi.

Anandan, C. and Gangatharan, M. 2006. Digital Libraries : From Technology to Culture. Kanishka Publishers, Distributors, New Delhi.

Anonymous. 2003. Internet Resources. MLI-005 PGDLAN Course Material. Indira Gandhi National Open University, New Delhi.

Anonymous. 2006.Open Source Movement - Asian Perspective. IASLIC, Kolkata.

Aquil, Mohd. And Siddique, Mohd. Asad. 2010. Blog and Blogging in Libraries. *Indian Journal of Library and Information Science.* 4(2) : 147-153.

Arms, William Y. 2001. Digital Libraries. MIT Press, London.

Arora, Jagdish and Trivedi, Kruti. 2010. UGC-INFONET Digital Library Consortium : Present Services and Future Endeavours. *DESIDOC Journal of Library & Information Technology.* 30 (2) : 15-25.

Arora, Jagdish and Trivedi, Kruti. 2010. INDEST - AICTE Consortium : Present Services and Future Endeavours. *DESIDOC Journal of Library & Information Technology.* 30 (2) : 79-91.

Asari, K. Ravindran. 2009. IT for Librarians. I.K. International Publishing House Pvt. Ltd., New Delhi.

Atkinson, R. 1996. Library Functions, Scholarly Communication, and the Foundation of the Digital Library: Laying Claim to the Control Zone. *The Library Quarterly.* 66 (3) : 239-65.

Babu, B. Ramesh and Rajendran, P. 2010. Innovation - Driven Librarianship : Expectation of Librarians and Library Users. SRM University, Kattankulathur, Tamil Nadu.

Baby, M.D., Raeghunatha, R. and Pradeepam, S.J. (Eds.) 2000. Changing Trends in Library and Information Science. Ess Ess Publication, New Delhi.

Balas, Janet L. 2001. How should Privacy be Protected in the Electronic Library. *Computers in Libraries.* 21 (6) : 53-55.

Bao, X. 2003. A Study of Web-Based Interactive Reference Services via Academic Library Home Page. *Reference & User Services Quarterly.* 42 (3) : 250-56.

Barton, Mary R. and Waters, Margaret M. 2004. Creating an institutional repository: LEADIRS workbook. Massachusetts: MIT Press. Available at <http://dspace.org/implement/leadirs.pdf>.

Basch, R. 1991. Books Online. *Online.* 15 : 13-27.

Bhatt, C. Vidyadhar. 2008. Is Digital Rights Management and IPR?. *DESIDOC Journal of Library & Information Technology.* 28 (5): 39-42.

Breeding, Marshall. 2002. The Open Source ILS : Still Only a Distant Possibility. *Information Technology and Libraries.* 21 (1) : 16-18.

Broadbent, Brooke. 2002. ABCs of E-learning : Reaping the Benefits and Avoiding the Pitfalls. Jossey-Bass.

Burman, Joginder Singh. 2007. Managing Libraries in Digital Era. Rajat Publications, New Delhi.

Chandel, A.S., Saikia, Mukesh, Prem Chand, Hosamni, H.G. and Chandrakar, Rajesh. (Eds.) 2010. Re-engineering of Library and Information Services in Digital Era. INFLIBNET, Ahemdabad.

Chandra, Ramesh and Shrivastava, A.P. 2003. Technological Changes in Libraries. Kalpaz Publications, Delhi.

Chowdhury, G.G. 2002. Digital Libraries and Reference Services : Present and Future. *Journal of Documentation.* 58 (3) : 258-83.

Chowdhury, G. and Chowdhury, S. 1999. Digital Library Research: Major Issues and Trends. *Journal of Documentation.* 55 (4) : 409-48.

Clarke, C. 2001. Subject Portals. Aridane. 29. Available at www.aridane.ac.uk/issue29/calrkiinftro.html.

Corson-Finnerty, A. 2000. Cybergifts. *Library Trends.* 48 (3): 619-33.

Cox, John E. 1997. Publishers, Publishing and the Internet : How Journal Publishing will Survive and Prosper in the Electronic Age. *Electronic Library.* 15 (2) : 125-31.

Coyle, Karen. 2002. Open Source, Open Standards. *Information Technology and Libraries.* 21 (1) :33-36.

Das, S.R. 2008. Library Automation and Information Technology. Arise Publishers & Distributors, New Delhi.

Dhiman, A. K. 1997. Computers and their Applications in Libraries. *Lucknow Librarian.* 29 (1-4): 11-15.

Dhiman, A.K. 1998. Modern Technology in Resource Sharing for Information Handling. *Library Progress.* 18(1-2) : 19-21.

Dhiman, A.K.2001. Role of Library Professionals in the Era of Information Technology. *Indian Journal of Information, Library & Society.* 14 (1-2) : 81-85.

Dhiman, A.K. 2001. Impact of Information Technology (IT) on Library Management. In Kalpana Dasgupta edited 'Library Practices for Effective Management' (47th All India Library Conference Papers). Indian Library Association, Delhi. Pp.191-202.

Dhiman, A.K. 2002. Resource Sharing in Digital Environment through Internet: Problems and Prospects. In H. Anil Kumar, P. Upadhyaya, S.R. Ganpule and P.C. Shah edited 'Internet Engineering for Libraries and Information Centres (Ninth CALIBER-2002 Papers)'. INFLIBNET Centre, Ahemdabad. Pp. 43-54

Dhiman, A.K. 2003. Internet Based Library Services. In Pandey S.K. Sharma edited 'Electronic Information Environment and Library Services: A Paradigm' (48th All India Library Conference). Indian Library Association, New Delhi. Pp. 99-106.

Dhiman, A.K. 2003. Intellectual Property Rights in Digital Environment. In Y. Singh et al., edited 'New Challenges in Information Management and E-learning in the Age of Globalization (SIS - 2003 Papers)'. IIT, Roorkee. Pp. 292-98.

Dhiman, A.K. 2003. Basics of Information Technology for Librarians and Information Scientists. 2 Vols. Ess Ess Publications, New Delhi.

Dhiman, A.K. 2004. Acquisition, Preservation and Retrieval of Digital Resources: Role of Library Consortia. In Ashu Shoukeen edited 'KODEL : Introspect and Prospects (50th All India Library Conference Papers)'. Indian Library Association, New Delhi. Pp. 116-26.

Dhiman, A.K. 2006. Developing Human Resources : How Much Effective and How Much Successful? In Manoj Kumar edited 'Digital Preservation, Management and Access to Information in the Twenty First Century' (PLANNER-06 Papers). INFLIBNET Centre, Ahemdabad. Pp. 134-38.

Dhiman, A. K. 2007. Information & Communication Technology Development and Changing Faces of Library & Information Science Education in India. *PEARL : A Journal of Library Science.* 1 (3) : 3-10.

Dhiman, A.K. 2007. Library 2.0: Emerging Trend in Library Services. In Jagtar Singh edited 'Developing Library and Information Resources and Services in the Internet Era (53rd All India Library Conference Papers).' Indian Library Association, New Delhi. Pp. 274-85.

Dhiman, A.K. 2008. Dynamics of Library Science and Future Librarianship. In A. Amudhavalli edited 'Dynamics in Digital Information Systems : Festschrift Volume in Honour of Prof. M. Bavakutty'. Ess Ess Publication, New Delhi. Pp. 124-39.

Dhiman, A.K. 2008. Digital Libraries: Futuristic Interpretations and Some Issues. In Muttaya Koganuramath edited 'Knowledge for All: role of Library & Information Centres (Proceedings of 54th All India Library Conference Papers held at TISS, Mumbai)'. Sita Publications, Mumbai. Pp. 223-32.

Dhiman, A.K. 2008. Hand Book of Special Libraries and Librarianship. Ess Ess Publications, New Delhi.

Dhiman, A.K. 2009. Open Access Initiatives and its Impact on Modern Libraries. *Indian Journal of Information, Library & Society.* 22 (1-2): 119-27.

Dhiman, A.K. 2010. Institutional Repositories : the Boon for Academic Community. In K.M. Khan, V. Gopakumar

and B.K. Vishala edited 'Empowering Library Professionals in Managing Digital Resources'. St. Agnes College (Autonomous), Mangalore. Pp.152-57.

Dhiman, A.K. 2010. Reference and Information Services in Digital Environment. In D.V. Singh edited 'Library & Information Science in Digital Era.' ILA, New Delhi. Pp. 355-63.

Dhiman, A.K. 2010. Evloving Roles of Library and Information Centres in e-learning Environment. IFLA confrance – 2010 Paper. Avaliable at: http:www.ifla.org/en/ifla76.

Dhiman, A.K. 2010. Librarian to Cybrarian: Changing Roles and Responsibilities of Library Professionals. In Jagdish Arora edited 'Re-engineering of Library and Information Services in Digital Era. (PLANNER-2010 Papers)'. INFLIBNET, Ahemdabad. Pp. 435-41.

Dhiman, A.K. 2010. Managing Electronic Resources in Modern Libraries : Some Issues. In R.K. Bhatt and Stanley Madan Kumar edited 'Knowledge Management in the Globalized Era.' Association of Agricultural Librarians and Documentalists of India, New Delhi. Pp. 373-78.

Dhiman, A.K. 2011. Institutional Repositories in E-Learning. *IJCA Special Issue on Wireless Information Networks & Business Information System.* (1): 17-21.

Dhiman, A.K. and Gupta, Rajkishore. 2008. Digital Resources and Digital Preservation Policy. In R.U. Meshram, D.H. Vairagare and V.K. Saxena edited 'Recent Advances in Library Technology and Innovatives (3rd All India Library Conference Papers of CGLA).' CGLA Nagpur Chapter, Nagpur. Pp. 105-15.

Dhiman, A.K. and Goswami, R. 2008. Conventional or Traditional Libraries in Digital Era. *Library Progress.* 28 (1) : 129-37.

Dhiman, A.K. and Gowsami, R. 2009. Uses and Prospects of Information & Communication Technologies in Libraries. In K.P.Singh and Rupinder Kaur edited 'Library & Information Technology : Driving Management Education'. Vayu Education of India, New Delhi. Pp. 12-19.

Dhiman, A.K. and Rana, Mahesh Singh. 2009. Perspectives on Digital Libraries. In Sanjya Kataria, B.S. Nigam and Ramakant Shukla edited 'Emerging Trends and Technologies in Libraries and Information Services'. KBD Publishers, New Delhi. Pp. 583-91.

Dhiman, A.K. and Gupta, Sushma. 2010. Copyright and IPR Issues in Digital Libraries. In B. Ramesh Babu and P. Rajendran edited 'Innovation - Driven Librarianship: Expectations of Libraries and Library Users. (ICIDL-10 Papers).' SRM University, Kancheepuram (Chennai). Pp. 819-25.

Dhiman, A.K. and Rani, Yashoda. 2005. Learn - Computer Basics and its Application in Libraries. Ess Ess Publications, New Delhi.

Dhiman, A.K. and Rani, Yashoda. 2006. Library Consortia: Some Problematic Issues. *Indian Journal of Information, Library & Society.* 19 (1-2) : 16-31.

Dhiman, A.K. and Rani, Yashoda. 2007. Resource Sharing, Networking and Library & Information Networks. Ess Ess Publications, New Delhi.

Dhiman, A.K. and Sharma, Hemant. 2008. Institutional Repositories: the Emerging Gateways of Accessing Knowledge in Networked Environment. *University News.* 46 (5): 100-03.

Dhiman, A.K. and Sharma, H. 2008. Access of Scholarly Publications through Institutional Repositories. *Pakistan Journal of Library Science.* 9 : 97-111.

Dhiman, A.K. and Sharma, H. 2008. Blogging and Uses of Blogs in Libraries. In Jagdish Arora edited 'Automation to Transformation' (6th International CALIBER-08 Papers). INFLIBNET, Ahemdabad. Pp. 437-45.

Dhiman, A.K. and Sharma, H. 2009. Knowledge Management for Librarians. Ess Ess Publications, New Delhi.

Dhiman, A.K. and Sharma, Hemant. 2010. Self-Archiving : the Alternative Way of Preserving Documents for Scholarly Communication. In Sanjay Kataria, John Paul Ambu K. and Shri Ram edited 'Emerging Technologies and Changing Dimensions of Libraries and Information Services (ETTLIS-10)'. K.B. D. Publications, Delhi. Pp. 537- 40.

Dhiman, A.K. and Sumankumari, R. 2010. Library 2.0 : the Concepts and Prospects. *PEARL - A Journal of Library and Information Science*. 4 (1) : 66-71.

Eqbal, Manowwer. (Ed.). 2011. Information Professional : Issues and Challenges in Digital Age. Pragun Publications, New Delhi.

Foster, Janet B. 1999. Web Reference : A Virtual Reality. *Public Libraries*. 38 (2) : 94-95.

Francis, A.T. 2005. Library Consortia Model for Country Wide Access of Electronic Journals and Databases. In 4th International Convention CALIBER Proceedings : Multilingual Computing and Information Management in Networked Digital Environment. INFLIBNET Centre, Ahmedabad. Available at http://eprints.rclis.org/archive/00004915.

Gibbons, S. 2004.Defining an Institutional Repository, *Library Technology Reports*. 40, No. 4, 6-10.

Gokhale, P.A. and Chandra, S. 2009. Web 2.0 E-Learning : the Indian Perspective. *DESIDOC Journal of Library*

and Information Technology. 29 (1) : 5-13.

Gopal, Krishan. 2000. Digital Libraries in Electronic Information Era. Authors Press, Delhi.

Harnad, Stevan 1999. 'Advancing Science by Self-archiving Refereed Research'. Science dEbates 31 July. Available at http://www.sciencemag.org/cgi/eletters/285/5425/197#EL12.

Harnad, Stevan 1999. Free at last: the Future of Peer-reviewed Journals. D-Lib Magazine, 5, 12. Available at http://www.dlib.org/dlib/december99/12harnad.html.

Hanard, Stevan 2001. The Self-archiving Initiative. *Nature.* 410 : 1024-25.

Higgs, E. (Ed.) 1998. History and Electronic Artefacts. Clardendron Press, Oxford.

Jadon, N.S., Jadon, G.S., Singh, A. and Rajput, B.S. 2009. Web 2.0 Technologies : Library 2.0 and its Implications for Libraries. *PEARL – A Journal of Library and Information Science.* 3 (1) : 8-13.

Jeevan, V.K.J. 2006. Publisher's Polices and Open Access. IASLIC XII Seminar Proceedings. IASLIC, Calcutta. Pp. 215-228.

Jibin, V.K. and Naseema, C. 2011. 3G Mobile Learning : Innovation in Education. *University News.* 49 (06): 28-31.

Joshi, S.S., Kumar Vinod and Sharma, Abha. (Eds.). Recent Trends in Libraries. Arihant Prakashan Pvt. Ltd., New Delhi.

Kataria, Sanjay, Paul, John Anbu, and Shri Ram. (Eds.). 2010. Emerging Technologies and Changing Dimensions of Libraries and Information Services. KBD Publications, New Delhi.

Kaufman, P.T. and Miler, T.J. 1992. Scholarly Communication: New Realties, Old Values. *Library Hi Tech.* 10 (3) : 61-78.

Khan, Khaisar Muneebala, Gopa Kumar, V. and Vishala, B.K. (Eds.). 2010. Empowering Library Professionals in Managing Digital Resources and Providing Extension Activities. St. Agnes College, Mangalore.

Khochar, R.S. 1999. Electronic Media and the Library Services. Discovery Publishing House, New Delhi.

Konganuramath, M. M. and Angadi, M. 2010. Digitization in an Academic Library : A Success Story at Tata Institute of Social Science. *DESIDOC Journal of Library and Information Technology.* 30 (1) : 38-43.

Kresh, Diane. (Ed.). 2009. The Whole Digital Library Handbook. Indiana Publishing House, New Delhi.

Kumar, Ashok Ram. 2008. Practical and Legal Protection of Computer Databases. *DESIDOC Journal of Library & Information Technology.* 28 (5): 43.48.

Lata, Suresh. (Ed.). Knowledge Dissemination through Libraries and Information Centres: Sharing Knowledge for the Future. K.B.D. Publications, New Delhi.

Lesk, M. 1997. Practical Digital Libraries : Books, Bytes and Bucks. Morgan Kaufmann.

Lichtenberg, James. 2001. What can Publishers Learn from Librarians. *Publishers Weekly.* 248 (12) :17.

Lynch, C. A. 2003. Institutional Repositories: Essential Infrastructure for Scholarship in the Digital Age. ARL: A Bimonthly Report, No. 226 (February 2003). Available at: http://www.arl.org/resour ces/pubs/br/br226/br226ir.shtml.

Macmillan, F. 2000. The Digital Copyright Deadlock. *Australian Library Journal.* 49 (2): 113-18.

Majka, D.R. 1999. Portals, Publishers and Privatization. *American Libraries.* 30 (9) : 46-49.

Mandal, Partha Sarathi. 2011. Blog and its Role in Library and Information Services. *DESIDOC Journal of Library & Information Technology.* 31 (3) : 155-58.

McDermott, Irene E. 201. Books in Print Wrestles with Amazon. *Searcher.* 9 (7) : 53-56.

Makri, Stephann, Blandford, Ann, Gow, Jeremy, Rimmer, Jon, Warwick, Claire and Buchanan George. 2007. A Library or Just another Information Resource? A Case Study of Users' Mental Models of Traditional and Digital Libraries. *Journal of the American Society for Information Science and Technology.* 58 (3) : 433-445.

Matthews, Judy and Richard W.W. 2001. Scholarly Sources in a Googely World. *Library Journal.* 126 (15) : 35.

Moran, Barbara B. 2001. Practitioners vs. LIS Educators : Time to Reconnect. *Library Journal.* 126 (18) : 52-55.

Moorthy, A.L. 2009. DRDO E-Journals Consortium. *DESIDOC Journal of Library and Information Technology.* 29(5) : 18-23.

Murthy, T.A.V., Salgar, S.M., Sharma, S.K. and Prakash, K. (Eds.). 2005. Multilingual Computing and Information Management in Networked Digital Environment. INFLIBNET, Ahemdabad.

Nagaraju, A.V.S.S., Ramesh, L.S.R.C.V. and Vithal, K.S.R. 2007. ICT Implementation and its Cutting Edge towards E-learning in the verge of Globalization *PEARL – A Journal of Library and Information Science.* 1 (4) : 39-41.

Nath, S.S., Sridhara, B., Joshi, C.M. and Kumar, Puneet. 2008. Intellectual Property Rights : Issues for Creation

of Institutional Repository. *DESIDOC Journal of Library & Information Technology.* 28 (5) : 49-55.

Natrajan, M. and Makhdumi, G. 2009. Safeguarding the Digital Contents : Digital Watermarking. *DESIDOC Journal of Library & Information Technology.* 29 (3) : 29-35.

Neuman, Delia. 1997. The World Wide Web as a Tool for Information Retrieval : An Explroatoty Study of Users; Strategies in an Open Ended System. *School Library Media Quarterly.* 25 : 229-36.

Nigam, B.S. and Kataria, Sanjay. (Eds.). 2008. Digital Libraries : A Festschrift Volume of Professor R.K. Rout. Mahamaya Publishing House, New Delhi.

Oder, Norman. 2000. Cataloguing the NET : Two Years Later. *Library Journal.* 125 (16) : 50-51.

Pace, Andrew K. 2002. Optimizing Library Web Services : A Usability Approach. *Library Technology Reports.* 38 (2): 1-81.

Pace, Andrew K. 2009. The Ultimate Digital Library : Where the New Information Players Meet. Indiana Publishing House, New Delhi.

Payette, S., Blanchi, C., Lagoze, C. and Overly, E.A. 1999. Interoperability for Digital Objects and Repositoires. D-Lib Magazine. 5 (3). Available at www.dlib.org/dlib/May99/payette/05payette.html.

Peeki, R.P. 1999. When is Website a Vortal? Vertical Portals seek to focus Contents to Attract More Visitors. *Information Today.* 16 (8) : 36-37.

Pinfield, S. 2004-05. Self Archiving Publications. In G.E. Gorman and Rowland Fytton edited 'International Yearbook of Library and Information Management 2004-2005: Scholarly Publishing in an Electronic Era.

Facet, London. Pp. 118-45. Available at eprints.nottingham.ac.uk/142/1/IYLIM04.PDF.

Pinfield, S. 2005. A Mandate to Self Archive? the Role of Open Access Institutional Repositories. *Serials.* 18 (1) : 30-34.

Pratt, G.F. et al. 1996. Guidelines for Internet Resource Selection. *College & Research Libraries.* 134-35.

Ramachander, M. 2008. Open Distance Flexible Learning and the Changing Role of University Libraries : A Perspective. *PEARL – A Journal of Library and Information Science.* 2 (3) : 4-8.

Ratnakar, K.V., Prerna and Satyanarayana, K. 2009. Consortia to Promote Access to Medical Information: Some Experiences of the Indian Council of Medical Research. *DESIDOC Journal of Library and Information Technology.* 29 (5) : 7-11.

Sahoo, K.C. 2004. Information Management with IT Application. Medallion Press, Ludhiana.

Satyanarayana, B., Babu, T. Ashok, Venkateswara Rao, L. and Sujatha, G. 1998. Multimedia : Its Applications in Library and Information Science. T.R. Publications, Chennai.

Schwartz, C. 2000. Digital Libraries : An Overview. *Journal of Academic Librarianship.* 26 (6) : 385-96.

Sharifabadi, S. Rezaei. 2006. How Digital Libraries can Support E-Learning. *Iranian Journal of Information Science and Technology.* 4(1) : 39-56.

Sharma, Parul and Kumar Rajesh. (Eds.). 2011. Impact of E-Resources in Education. Himani Publications, Ghaziabad.

Sharma, Vinod Kumari and Goswami, Sumit. 2001. Some

Basic Aspects for Creation of Website. *DESIDOC Bulletin of Information Technology.* 21 (2) : 17-34.

Siddamalliah, H.S. and Butdisuwan, S. 2009. HELIS Network– Not just a Consortium of e-resources. *DESIDOC Journal of Library & Informations Technology.* 29(5): 12-17.

Singh, Khushpreet. 2009. Print to Electronic Journals : A Paradigm Shift. *PEARL – A Journal of Library and Information Science.* 3 (4) : 78-81.

Singh, Suryanath. (Ed.). 2004. Horizon of Information Technology : New Age, New Wage Trends and Impact of Library Science. Inamdar Bandhu Prakashan, Pune.

Sinha, S.C. and Dhiman, A.K. 2001. Citation Analysis of the Research Field and Information Technology Development. Ess Ess Publications, New Delhi.

Spies, P.B. 2000. Libraries, Leadership and the Future. *Library Management.* 21 (3) : 123-27.

Sreekala, E. 2010. Pedagogical Lacunae in Web Based Learning. *University News.* 48 914) : 19-21.

Stephenson, Carol and Fullerton, Anne. 2004. A Consortia Approach to Interlibrary Loan. *Educase Quarterly.* 4 : 75-78.

Suber, Peter. 2008. Open Access and Quality. *DESIDOC Journal of Library and Information Technology,* Vol. 28(1) : 49-56.

Suber, Peter. 2008. Open Access to Electronic Theses and Dissertations. *DESIDOC Journal of Library and Information Technology.* 28 (1) : 25-34.

Tennant, Roy. 2001. The Digital Library Divide. *Library Journal.* 126 (13) : 37-38.

Tripathi, Manorama and Jeevan, V.K.J. 2009. Evolving Best

Practices in Library Services for Distance Learners : A Comparative Study of IGNOU and UKOU. *PEARL– A Journal of Library and Information Science.* 3 (3) : 9-16.

UNESCO, 2003. Guidelines for the Preservation of Digital Heritage. Information Society Division United Nations Educational, Scientific and Cultural Organization, Australia. Available at unesdoc.unesco.org/images/0013/001300/130071e.pdf.

Varalakshmi, R.S.R. 2010. Digital Environment.- the Challenges and Opportunities. *PEARL – A Journal of Library and Information Science.* 4 (1) : 1-5.

Varatharajan, N. 2007. Digital Librarians and Library Professionals in the Changing Scenario. *PEARL – A Journal of Library and Information Science.* 1 (4) : 42-45.

Vasishta, Seema. 2011. Open Access Movement: New Prospects of Scholarly Communication in Higher Education in India. *University News.* 49 (25): 15-18, 30.

Veer, D.K. 2009. Preservation of Library Resources in Digital Era. *PEARL – A Journal of Library and Information Science.* 3 (2) : 28-34.

Visakhi, P. 2009. Consortium for E-Resources in Agriculture. *DESIDOC Journal of Library & Information Technology.* 29 (5) : 24-30.

Watson, J and Fenner. J. 2000. Understanding Portals. *Information Management Journal.* 34 (3) : 18-22.

Wingert, Robert G. 2001. Some Ethical Aspects of being an Information Professional. *Library Trends.* 49 (3) : 486-509.

White, M. 1999. Enterprise Information Portals. *Electronic Library.* 18 (5) : 354-62.

Yoder, A. 2003. The Cyborg Librarian as Interface: Interpreting Postmodern Discourse on Knowledge Construction, Validation and Navigation within Academic Libraries. *Libraries and the Academy.* 3 (3) : 381-92.

Zhang, Y. 1998. The Impact of Internet Based Electronic Resources on Formal Scholarly Communication in the Area of Library and Information Science. : A Citation Analysis. *Journal of Information Science.* 24 (4) : 241-54.

Zink, S.D. 1991. Will Librarians have a Place in the Information Society?. *Reference Service Review.* 19 (1): 76-77.

Zumalt, Joseph R. and Robert, W Pasicznyuk. 1998. The Internet and Reference Services. *Reference and User Services Quarterly.* 38 (2) : 165-72.

Index

Barriers-Digital Library Initiatives - 1344

Blogs - 393

CCF - 620

CD-ROMs- 248

Computer Infrastructure - 191

Consortia for Medical Information - 1138

Consortium for E-Resources-Agriculture - 1130

Copyrights - 981

Copyrights Law - 994

CORC - 237

CSIR Consortia - 1115

Data Models - 730

Database Management Software - 198

Databases - 323

Datawater Marking - 1020

Descriptive Metadata - 601

Designing Website - 907

Development-Library Automation Software - 29

Digital Archeology- 797

Digital Camera - 758

Digital Collections - 136

Digital Libraries - 11

- Advantages - 94
- And conventional libraries- 101
- And E-learning - 1231
- Architecture - 221
- Attempts in India - 25
- Characteristics - 51
- Components - 131
- Definitions - 41
- Disadvantages - 94
- Evolution - 11
- Formats - 153
- Foundations - 11
- Framework - 55
- Myths - 125
- Services - 212
- Steps involved in building - 208

Digital Library Initiatives - 1340

Digital Library Initiatives-Barriers - 1344

Digital Library Services - 212

Digital Library Software - 1279

Digital Preservation-Ways - 290

Digital Reference - 230

Digital Reference Models - 236

Digital Reference Services - 218, 1243, 1359

Digital Resource Organization - 200
Digital Rights Management - 284, 1015
Digitization Policy - 716
Digitization Process - 763
DRDO E-journal Consortium - 1125
DSpace - 1292
Dublin Core - 612
DVD - 252
E-Book Formats - 280
E-book Reader Software - 288
E-book Resources - 289
E-journals - 264
E-Learning - 1196
E-Learning-Benefits -1206
E-Learning Components - 1225
E-Learning Implications - 1211, 1219
Electronic Libraries - 3
    Functions - 5
    Roles - 5
Electronic Resource Evaluation - 357
Electronic Thesis - 321
Encoded Archival Description - 618
EPrints - 811, 1283
E-Resource Archiving - 348
ETD - 870
Ethics - Inscription - 1034
Ethics-Encryption - 1034
Evaluation - E-Resources - 355
Evaluation - Internet Resources - 357
Evaluation - Websites - 357
Face Book - 403
FEDORA - 1284
FORSA - 1113
Front Page 2000 - 924
Ganesh Digital Library - 1289
Global Information Locator Service-616
Graphic Software - 937
Greenstone - 1307
Hardware-Digital Preservation - 748
HELINET Consortia - 1120
HTML - 920
Hybrid Library Services - 228
ICAST Consortia - 1116
IIM Library Consortia - 1114
INDEST - 1142
Information Searching - Four Phase - 948
Institutional Repositories - 854
Integrated Library System - 196
Intellectual Property - 996
Intellectual Property Rights - 1006
Interlibrary Loan Services - 220
Internet
    Facilities - 434
    Getting Started - 431
    In Arts & Humanities - 457-511
    In Libraries - 448
    In Science & Technology - 556-587
    In Social Sciences - 511-556
    Resources - 457
    Surfing - 438, 412
Internet Services - 213

Intranet - 587

IPRs - 1006

ISI Library Consortia - 1109

ISRO Library Consortia - 1118

J-Gate - 1105

Learning Laboratories - 1408

Libraries-Learning Laboratories - 1408

Library 2.0 - 1366

Library Automation

- Activities, India - 31
- Software Development - 29

Library Automation Activities, India - 31

Library Automation Software-Development - 29

Library Consortia

- Benefits - 1060
- Growth - 1055
- Issues - 1060
- Models 1073 - 1045

Library Cooperation-Indian Scene - 1043

Library Cooperation-International Scene - 1042

Library Role

- Copyrights - 1037
- IPRs - 1037

LOCKSS - 1285

Manpower Training - 207

MARC-21 - 608

MARCXML - 621

Meta Resources - 659

Metadata - 599

Metadata Standards - 606

Metadata Crosswalk - 639

METS - 622

Mobile Learning -1247

MODS - 622

Networked Infrastructure - 191

Newspaper Clipping Service - 214

Offline Publications - 245

ONIX International - 619

Online Resources - 308

Online Searching - 378

OPAC - 972

Open Access

- And IPRs - 1028
- Concept - 800
- Initiatives - 803
- India - 862
- Initiatives - International - 861
- Journals - 811

Open Access-IPRs - 1028

Open Access Concept - 800

Open Access Initiatives - 803

Open Access Initiatives - India - 862

Open Access Initiatives - International - 861

Open Access Journals - 811

Open Source Software - 1264

Open Source Software-Libraries - 1277

Open Source Software - Advantages - 1273

Open Source Software-Disadvantages- 1274

Patents - 1026

Plagiarism - 997

Portals - 180

Preservation-Principles - 682

RDF Model - 626

References Sources - 333
Resource Discovery Network - 962
RSS Feeds - 1362
Scanners - 754
Search Engines - 441, 941, 954
Searching Techniques - 441
Self Archiving - 881
Software-Digital Preservation - 738
Software Piracy - 998
Structural Metadata - 602
Subject Gateways - 167
Text Encoding Initiatives - 617
TIFR - 1109
Trade Marks - 1026
Trade Secrets - 1027
Traditional Libraries - 105
UGC-INFONET Digital Library Consortia - 1168
URL - 936
VIC Consortium - 1122
Virtual Libraries - 8
Virtual Resources - 308
Visual Resource Association - 619
VLET - 1286
Warwick Framework - 632
Ways-Digital Preservation - 690
Web 2.0 - 1366
Web Authoring - 938
Web OPACs - 972
Web Page - 903
Web Servers - 197
Weblogs - 303
Website Designing - 907
Website Hosting - 940
Website Submission - 943
Wiki - 385

ABOUT THE AUTHORS

Dr. Anil Kumar Dhiman holds M.A., M.Sc., MLISc., B.Ed., PGDCA and Ph.D. Degree in Botany and Ph.D. Degree in Library & Information Science. He is Fellow and Life members of various professional associations and has more than 100 papers and 27 books to his credit in both field of his study, i.e., in Library & Information Science and Botany. He has more than two-decade working experience in the library profession and presently is *Information Scientist* at Gurukul Kangri University, Hardwar (India). He had taught Library Science to the students of Library Science at Library Science Training Cetnre, Roorkee for about a decade and also had been the Counsellor of Library Science at Haridwar Centre of UPRTOU for two years during 2000-2002. He has also guided 22 candidates for their M.Phil. dissertations in library science in various universities. He is recipient of the APSI Young Scientist Award and Gold Medal in 1999, USSHLE-IJILIS-PBDBBS-2003 Award in Library & Information Science, and Glory of India International Award and Gold Medal in 2006.

Smt. Yashoda Rani holds M.A., M.Lib Sc., M.Phil (Library Science) and DNYS (Diploma in Naturopathy and Yogic Science). She has co-authored nine books with Dr. Dhiman and also has contributed a few papers in journals and seminar proceedings.

Ess Ess Publications

4831/24, Ansari Road, Darya Ganj, New Delhi-110 002
Phones : 41563444, 23260807 Fax 011-41563334
E-mail : info@essessreference.com
www.essessreference.com

ISBN: 978-81-7000-656-5

Rs. 3950/- (Per Set)